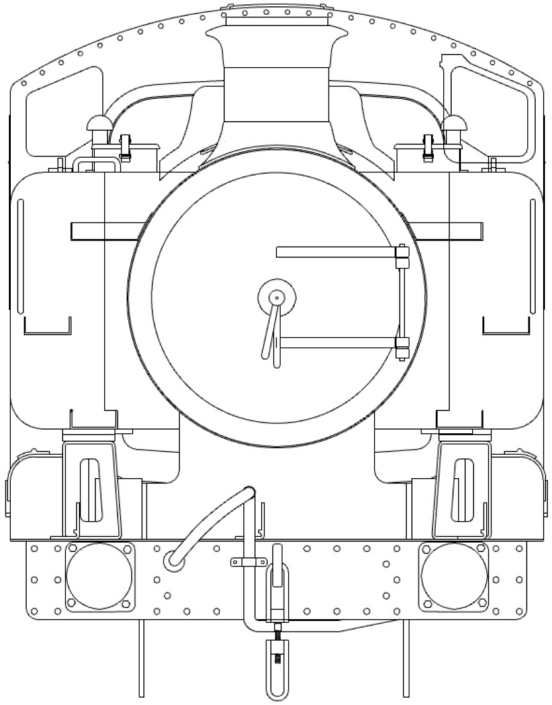
GWR 94XX CLASS LOCOMOTIVE



CAUTION.

This product contains etched parts with very sharp edges and castings that may contain lead. Neither the Manufacturer, Distributor or Retailer can accept any liability for illness, injury or consequential damage caused when handling or building this product.

Read any instructions before assembly. Do not eat or drink whilst handling. Wash hands after use.

BRIEF HISTORICAL DETAILS

This class of engines were designed and built to answer a request from the traffic department for more 8750 engines. Allegedly the Board wanted a more modern looking engine so Hawksworth set to and designed and built the last GWR engine, the later 1500 Class were BR built. Large numbers of the engines were built by sub contractors and some of these engines had boilers supplied by Swindon. Not all the design changes were successful. The wider cab made it harder for the driver to reach the brake handle while shunting and the change from coil springs on the rear axle to underhung leaf springs made the ride more lively. The engines were built as follows:

Lot	Numbers	Built	Builder
365	9400-9	1947	Swindon
382	9410-59	1950-1	R Stephenson
383	9460-89	1951-3	R Stephenson
384	8400-49	1949-54	Bagnall
385	8450-79	1949-52	Yorkshire Engine Co.
386	8480-99	1952	R Stephenson
387	3400-9	1955-6	Yorkshire Engine Co.

The following Swindon drawings were used in designing the kit:

122691	08/1946	Lot 365 General Arrangement
122692	11/1945	Lot 365 Erecting Plan
122683	10/1945	Lot 365 Arrangement of Cab,Bunker & Splashers
124742	10/1947	Arrangement of Boiler Mountings S/10 Boiler

VARIATIONS POSSIBLE WITH THE KIT

A photograph of your chosen locomotive is recommended when sorting these variations.

Rivets. The locomotives built by R Stephenson have a different pattern of rivets on the two horizontal rows at the base of the bunker. Some Yorkshire Engine Co. locomotives are the same. Some engines (9410 & 9411) appear to have no lines of rivets on the cab and bunker.

Cylinder Sloping Front Cover. Locomotives appeared with and without this cover.

Rear Buffer Beam Footstep. The lower footsteps for the bunker were either attached to the rear of the hanging plate or to the the rear buffer beam. Some locomotives had the footsteps removed.

VARIATIONS NOT POSSIBLE WITH THE KIT.

Chimneys. Some of the contractor built locomotives have a chimney with a sharper rim. It is not possible yet to provide such a chimney.

CHASSIS OVERVIEW

Note that many of the components for both chassis and body are handed left/right and care must be taken to ensure the correct component is used. Components are not always identified left/right separately but with care and common sense no problems should arise.

Before construction can commence you have to decide which particular chassis you are going to construct. The options are:

Gauge.

For Finescale, where little sideplay is required, the widest spacers can be used but they will need careful filing to make their width 26.0 mm. If you require your engine to negotiate sharp curves then the middle width spacers should be used.

The widest frame spacers supplied are suitable for Scaleseven and care will be needed to allow sufficient sideplay, especially in the leading axle to enable the model to negotiate moderate curves.

Suspension.

Rigid. The kit is supplied with top hat bearings to build a rigid chassis. Open out the main axle holes to accept top hat bushes and solder them in place. If the leading axle is 5/32" diameter then reduce the bearing diameter accordingly by fitting a sleeve from short lengths of the 3/16" tubing provided.

Sprung. If you are going to fit sprung horn blocks, you should open out the frame slots by cutting up the half etched lines and follow the manufacturers instructions.

Compensated. The simplest and most reliable suspension system is beam compensation and the necessary compensation beams are provided in the kit. Not provided are the hornblocks and bearings which are available as an extra item which includes instructions for aligning the hornblocks accurately.

Pickups. No pickup material is provided. The options are:

Scrapers. Attached to the middle frame spacer using printed circuit board.

Plunger. Open out holes P and fit according to the manufacturers instructions. It may not be possible to use plunger pickups if you wish to fit the inside motion because they may foul each other.

Split axle/frame. We leave this to you! Some useful information can be found at http://www.euram-online.co.uk/tips/splitaxle/splitaxle.htm.

COMPONENTS NOT SUPPLIED

WHEELS

Driving wheel - 4’ 7", 14 spoke, 10” pin between, 3/16" diameter axle (3) Slater's Ref. 7855WP

A Scale 7 wheel set is available from the Scale 7 Group stores.

MOTOR/GEARBOX

A Canon motor with a SDMP 40L/15 gearbox (available from Finney7).

CRANKPINS

Steel crankpins are available from Finney7.

INSIDE MOTION

A separate kit is available from Finney7 to construct the working inside motion.

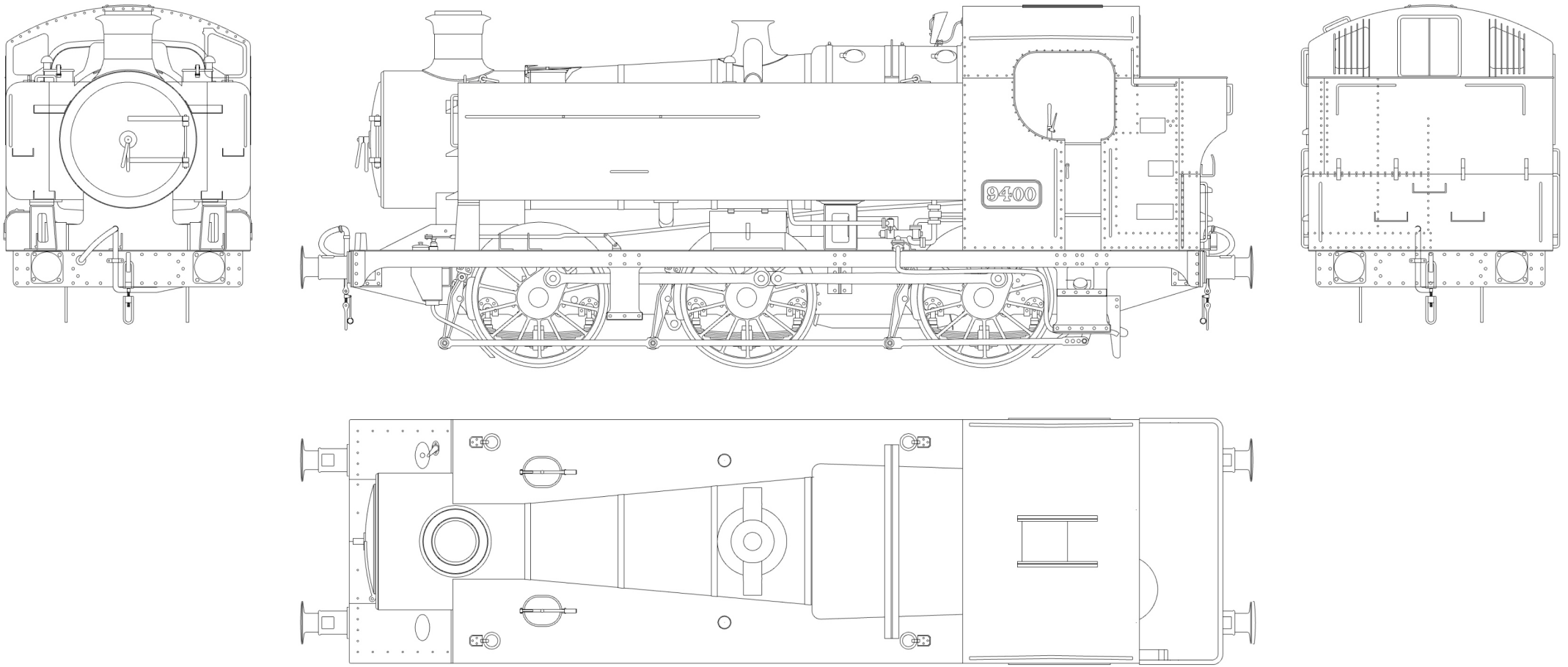


Fig 1. GWR 94XX in Original Condition.

CONSTRUCTING THE CHASSIS 1

IMPORTANT

This kit uses twist tabs to assemble the model. Thread the tabs through the matching slot and when the part is in tight contact twist the tab through no more than 10°; any more will result in distortion. For most tabs 5° twist will be sufficient.

FRAMES

Having decided which type of chassis to construct, you can now start construction by preparing the frames (C1 & C2); these instructions will detail a compensated chassis. Open out the following holes in the frames:

- B Brake hanger pivots - 0.8mm
- R Reversing shaft - 1.6mm
- C Compensation beam pivot - 2.0mm
- S Spring mounting holes - 1.0mm

Do not clean off the cusp at this stage; this is done after the overlay is soldered on.

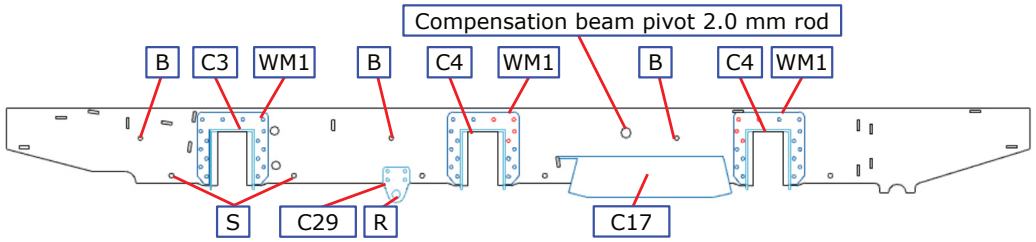


Fig 2. Frame Preparation

No.	Description	Sheet	No.	Description	Sheet
C1	Left frame	1	C14	Compensation beams (4)	1
C2	Right frame	1	C15	Compensation beam washer/spacer (6)	1
C3	Front axle horn guides L & R	1	C16	Ash pan side & top (2)	1
C4	Centre axle & rear axle horn guides L & R	1	C29	Weighshaft pivot overlay	1
C5	Keeper plates	1			

Compensation Beam Pivots. Drill a vertical 2mm hole 3.5mm into a piece of wood. Insert a 4mm long piece of rod into the hole. Thread a frame over the rod with the outside face on top. Solder the rod to the outside of the frame ensuring that it is secure. Dress flat the rod on the outside face. Repeat for the other frame.

Compensation Beams. Laminate two compensation beams (C14) together and clean up. Place two compensation beam spacers (C15) onto the rod soldered to the frame followed by the compensation beam. Place a compensation beam spacer over the rod and solder in place so that the beam is secure but can pivot easily. Repeat for the other side

Horn Guides. Fold the sides of the horn guides (C3 & C4) through 90° and check the fit in the slots in the frames; test with the axleboxes. The axlebox should just slide smoothly up and down the horn guide. Solder the hornguides in place. Remove the nuts shown in red in Fig 3 on the cast hornguides (WM1), they overlap with the compensation beams. Fit the cast hornguides (WM1) around the horn cheeks. Check that the axlebox still slides easily with no slop and then fit the keeper plates (C5).

Springs. Fit the springs (BR1) into the mounting holes and solder in place. Clean up the outer face to ensure that it is smooth and flat

Ashpan. Fold the ashpan side (C16) through 90° and place into the slots in the frames and twist the tabs. When satisfied that all is square, solder the joint.

Weighshaft bracket overlay. Emboss the rivets on the weighshaft pivot overlay (C29) and solder in place as shown in Fig 4 on the inside face of the frames.

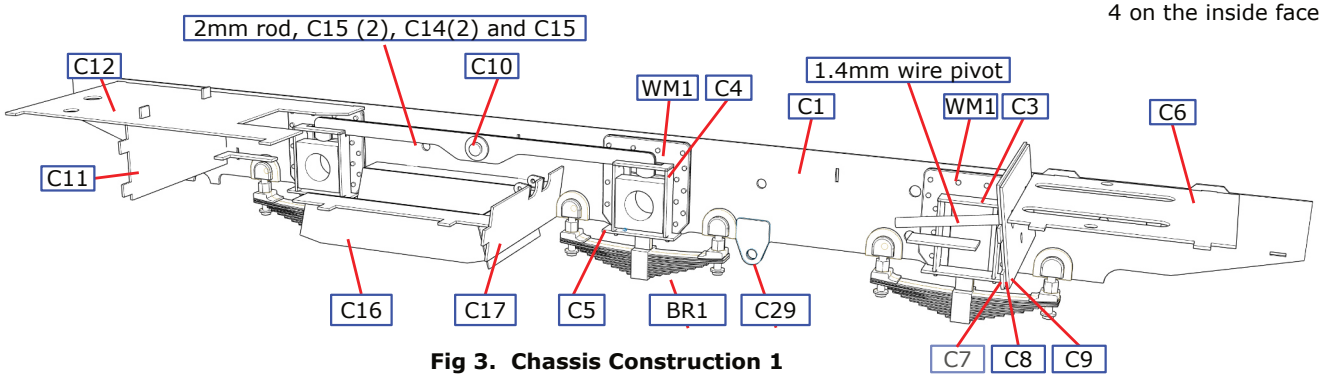


Fig 3. Chassis Construction 1

CONSTRUCTING THE CHASSIS 2

FRAME SPACERS AND ASSEMBLING THE CHASSIS.

The frame spacers are designed to be used with the cusp on: do not remove the cusp.

Cylinder face. Drill a 1.4mm hole, 3mm deep, into a block of wood or Tufnol and insert an 18mm length of 1.6mm steel wire into the hole. Thread the cylinder front packer, (C9) middle packer (C8) and the cylinder rear face (C7) over the wire; the cylinder rear face should be on top of this stack. Align the edges and then solder together and solder to the wire.

Fold out the motor retaining tabs on the middle vertical spacer (C10) and solder the folds.

The slots in the rear horizontal spacer (C12) for the rear vertical spacer (C11) are in the wrong place. Remove the two tabs on the top of the vertical spacer. Assemble the horizontal spacer and then the vertical spacer into the frames and twist the tabs.

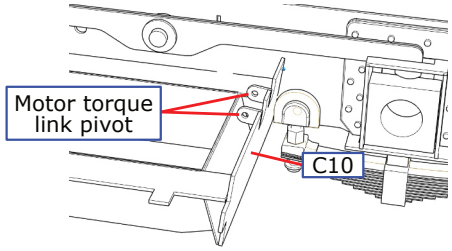
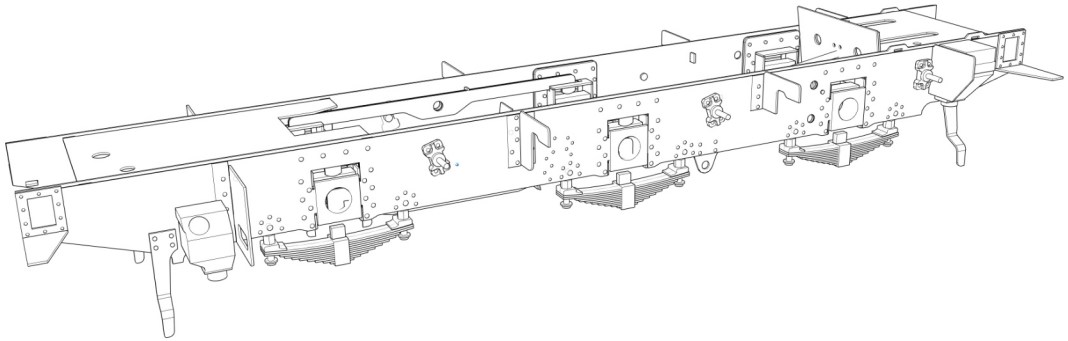


Fig 4. Middle Vertical Spacer

Assemble the front spacer assembly of the cylinder front face and the front horizontal spacer (C6) into the slots in the right frame and twist the tabs to secure. Repeat with the left frames. Insert the middle spacer into the two frames and secure the tabs. Finally insert the rear spacer assembly tabs into the rear of the frames and secure.

Now check that everything is square and that the spacers are hard against the frames. If all is well solder the spacers to the frames checking constantly that the chassis is square and the frames are straight.

Solder the ash pan front (C17) in place. Remove the tags from the outside of the frames and finish the outside flat.



No.	Description	Sheet
C6	Front horizontal spacer	1
C7	Cylinder rear face	1
C8	Cylinder rear face middle packer	1
C9	Cylinder rear face front packer	1
C10	Middle vertical spacer	1
C11	Rear vertical spacer	1
C12	Rear horizontal spacer	1
C13	Loudspeaker support	1
C17	Ash pan front	1
C18	LH Frame overlay	1
C19	RH Frame overlay	1
C27	Buffer beam bracket lower web	1

Frame Overlays. Emboss all the rivets in the frame overlays, left and right (C18 & C19). Remove the tags on the top surface of the overlay. There is a gap between the top of the overlay and the top of the frame to allow a wire to the speaker to route to the planned speaker position under the cylinders. Use a buffer beam bracket lower web (C27) to align the overlay at the front and rear of the frame. Using a pair of small Bulldog clips to hold the overlay in place helps enormously. Tack solder the overlay to the bottom of the frame in at least six places. Then do the same to the top of the overlay. Now make a continuous seam of solder around the overlay. Clean up and repeat for the other frame.

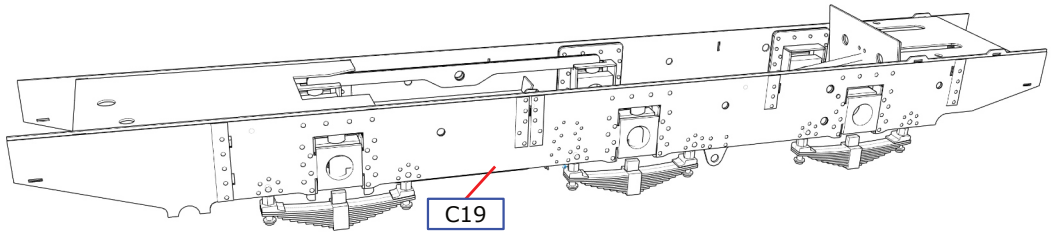
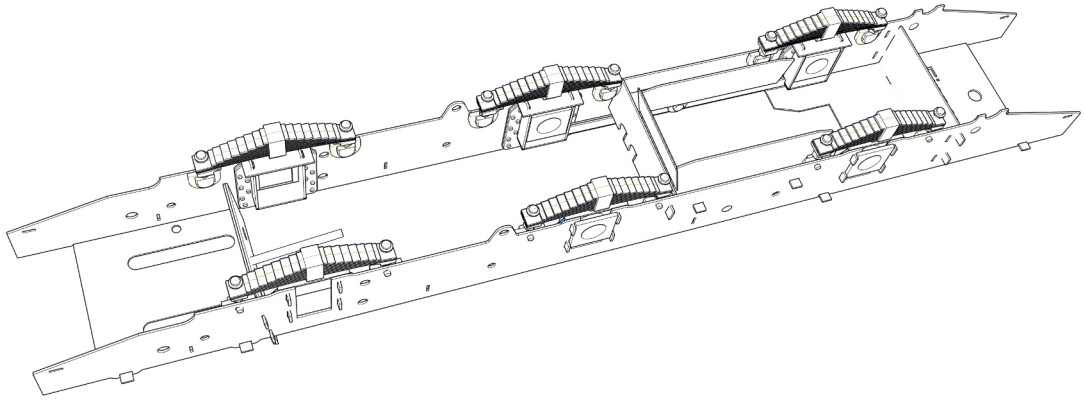


Fig 5. Chassis Overlays



CONSTRUCTING THE CHASSIS 3

Guard Irons. In turn, take each front and rear guard iron (C21 & C20) and remove the cusp, emboss the four rivets and fold to match the guard irons on the GA. Solder a small fillet of solder into each half etch fold line and then solder the guard iron in place on the frame. Repeat for all four guard irons.

Footplate brackets. Remove the front footplate braces (C22) from the etch and remove the cusp from all edges except the tab. Place the tab into the slot in the frames as shown in Fig 7, twist through 5° and solder to secure. Remove the tab and file flat. Repeat for the other side. Repeat this process for the front step braces (C23), the middle footplate brace (C24) and the rear step brace (C25).

Buffer Brackets. Take a buffer beam bracket lower web (C27) and remove the cusp. Place into the chassis slot and twist to retain. Solder in place from inside the chassis to hold square. Now take a buffer beam bracket flange (C26), remove the cusp and emboss the eight rivets. Tin the back of the bracket and then solder in place on the chassis hard against the web to ensure the web is square. Repeat for all four brackets**.**

Weighshaft. This is simplified in this kit but a detailed weighshaft will be available as part of the inside motion kit. Thread the 2 weighshaft arms (C28) onto a 28mm length of 2.0mm nickel silver rod 2mm from one end. Solder the arm together and clean up the cusp. Fold a dog leg 1mm to the outside 2mm from the top. Open out the holes in the brackets to 2.0mm so that the rod will slide through. Thread the rod through the holes in the bracket and solder in place with the arm near vertical. Refer to Fig 7.

No.	Description	Sheet	No.	Description	Sheet
C20	Rear guard irons	1	C25	Rear step brace	1
C21	Front guard irons	1	C26	Buffer beam bracket flange	1
C22	Front footplate brace	1	C27	Buffer beam bracket lower web	1
C23	Front step brace	1	C28	Weighshaft arm	1
C24	Middle footplate brace	1			

Brake Pivots. Cut three 40mm lengths of 1.0mm brass wire for the brake pivots. Solder in place in the holes in the frames. Clean up and fit the brake pivots (BR3). The front one sits vertical, the centre and rear ones are at an angle. Refer to Fig 6. Cut the wire from between the frames and clean up.

Sand Boxes. Drill 0.8mm holes for the sand pipes in the sandboxes, front left (WM2), front right (WM3), rear left (WM4) and rear right (WM5). Glue the sandboxes on the frame with the cast pin in the hole in the frames. When ready, bend the sanding pipes from 0.8mm wire to match the GA.

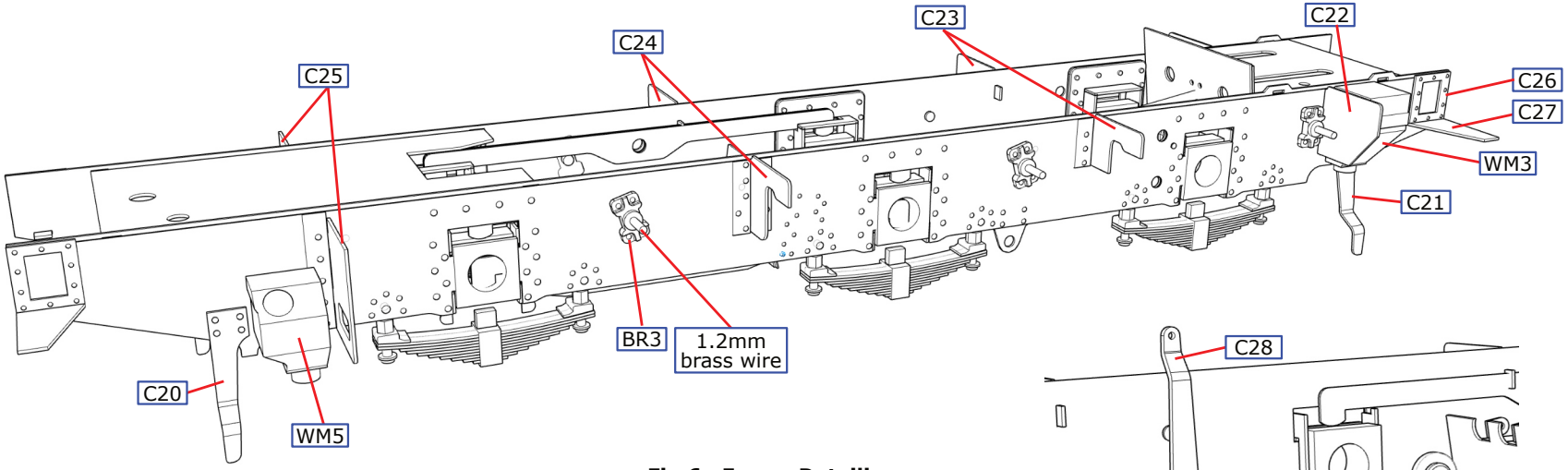


Fig 6. Frame Detailing

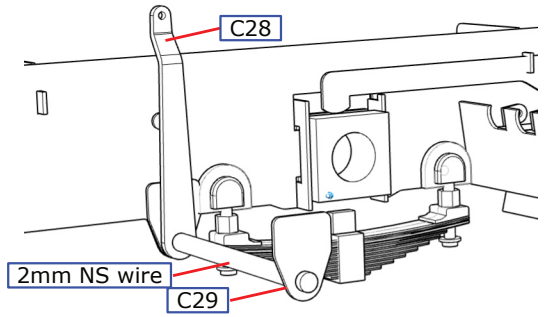


Fig 7. Weighshaft

CONSTRUCTING THE COUPLING RODS

Coupling Rods. All these components are to be found on the Coupling Rod Etch. With a 1.4mm drill open out the crank pin holes in the coupling rods, front (R1) and rear (R4). With this bit, drill through the coupling rod holes into a block of hard wood or a piece of Tufnol so that two 1.4mm drills can act as mandrels to align the various laminations of the rods; ensure that they are vertical. Remove the first front coupling rod from the etch and place outer face down so that the inner faces can be sweated together; tin the mating face generously. Apply a generous amount of flux and thread the matching lamination of the pair down onto the lower lamination. Apply a hot soldering iron to either end of the rod to melt the solder and then solder the half etched portion together without applying downward pressure to distort the rod.

Open out the coupling rod holes in the half etched knuckle overlays (R2 & R3) to fit the mandrels.

Fig 8. Method for Constructing Coupling Rods

Tin the upper face of the rod, apply flux and thread the knuckle overlay down the wire and solder in place. Repeat for the other overlay for that side. Then turn the rod over and repeat the fitting of the knuckle overlays on that side. Repeat this process for the remaining rods.

The rods have been deliberately etched too large so that the thin etched edges can be carefully filed so that the 'laminated' effect is lost and the rods appear to be made from one piece of metal. The crankpin holes now need carefully opening out until they just fit, with no free play, onto the crankpins.

The fork joints are now pinned using the 1.6mm nickel silver wire. Retain the pins, which should be a tight fit, by lightly soldering on the inner face of the rods.

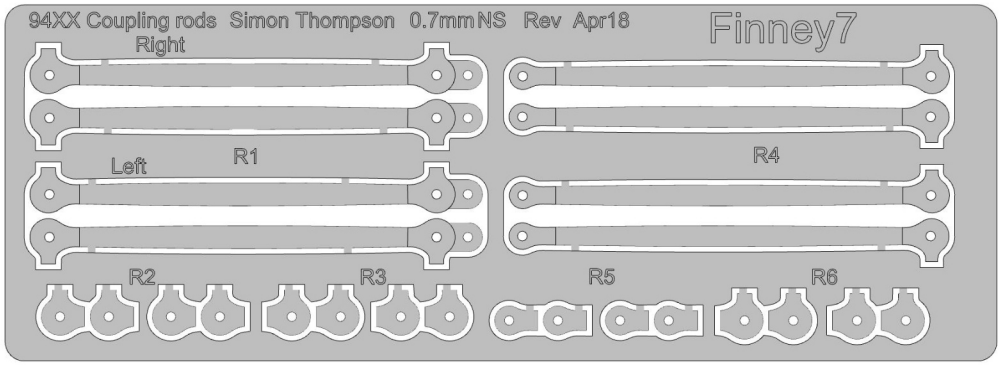


Fig 9. Coupling Rod Etch

CONSTRUCTING THE CHASSIS 4

Trial assembly. Now assemble the wheels onto the axles and fit to the chassis to check that the compensation works properly and that the chassis is sitting level. Check that the chassis moves without resistance. If necessary polish the bearing surface of the tight axle. Fit 3/16" axle washers of appropriate thickness to control side-play. Fit the coupling rods and again check for easy movement; if there is some binding ease the fit of the coupling rod that is binding.

Brakes. The brake hangers (BR4) need the 0.7mm blind holes in the back to be opened up for the wire pivot for the plastic brake shoes. The brake shoes are held in place by a small piece of 0.7mm wire leaving the brake shoes free to pivot. Also clear the top holes 1mm and the bottom holes 0.9mm.

Solder the steam brake cylinder (BR43) into the hole on the rear frame spacer. On the brake shaft (BR5) clean up the pins on the brake rod cranks. They should be 0.9mm diameter and fit the rear brake pull rods (C33). Position the brake shaft into the hollows on the rear frame with the steam brake crank over the cylinder operating rod. Solder in place. Add the handbrake operating rod from 0.9mm wire.

The cross shafts are made from a piece of 0.9mm wire and a piece of 1.6mm tube. The tube should be finished to 30.4mm long. Place a brake hanger onto the front pivot and then slide a piece of 0.9mm wire, at least 42mm long, through the hanger. Thread a piece of tube onto the wire and then add the other brake hanger. Solder the wire to the hangers from behind ensuring that the hangers are in line with the wheels. Repeat for the centre wheel set. The rear brakes just need a 9mm piece of 0.9
each side.

No.	Description	Sheet
C30	Front brake pull rod	1
C31	Front brake rod front and rear overlay	1
C32	Front brake rod centre overlay	1
C33	Rear brake pull rod	1
C34	Rear brake pull rod front joint overlay	1
C35	Rear brake pull rod rear joint overlay	1
C36	Leading and trailing wheel balance weights	5
C37	Driven wheel balance weight	5

Open out the holes in the front pull rods (C30) with a 0.9mm drill. With this bit, drill through the pull rod holes into a block of hard wood or a piece of Tufnol so that a 0.9mm drill can act as a mandrel to align the various laminations to the rods. Solder the front brake rod front and rear overlays (C31) and the centre overlay (C32) into place on the inside of the brake rods. The rods have been deliberately etched too large so that the thin etched edges can be carefully filed so that the 'laminated' effect is lost and the rods appear to be made from one piece of metal.

Repeat for the rear pull rods (C33) and the front and rear joint overlays (C34 & C35).

Place the front pull rods onto the cross shafts and tack in place. Adjust so that the brake shoes are just clear of the wheels. Add the rear pull rods and solder in place to the rear brake hangers. This assembly should spring off the brake pivots and the brake shaft.

Balance weights. Using a photograph of your chosen engine, glue the balance weights (C36 & C37) in position on the wheels.

Fit the ATC Battery (WM15) onto the right hand frames just in front of the cab steps.

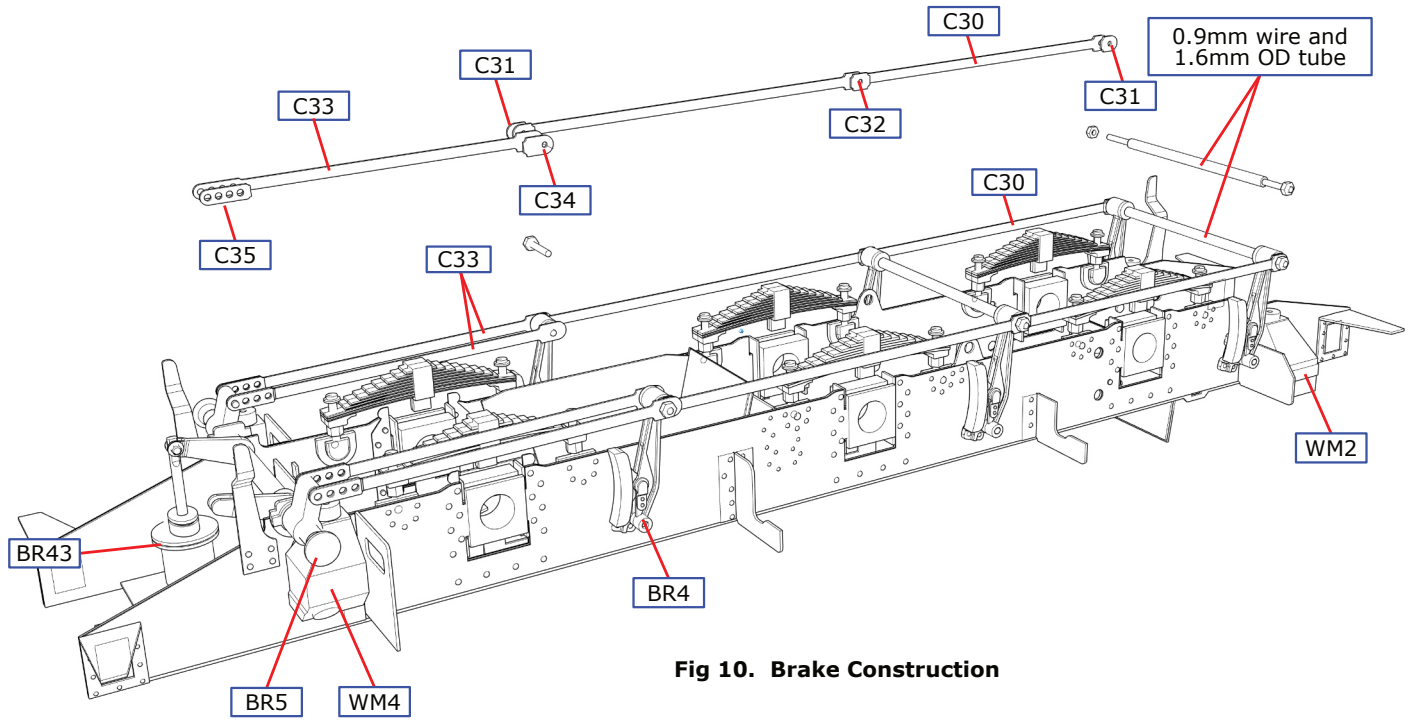


Fig 10. Brake Construction

FOOTPLATE 1

There are a number of long and thin parts in this assembly. To avoid a heat build up that will make the part expand, we recommend the following technique. Initially hold parts in place with few quickly made tack joints. To fully secure the part, apply plenty of flux and solder the seam in short lengths of no more than 10mm. Start at the centre and work outwards to both ends. It is best to use a hot iron, make the joint quickly and not dwell on the part. Give the heat some time to dissipate before making the next length of the seam. Patience.

No.	Description	Sheet
F1	Footplate support	2
F2	Front buffer plank	2
F3	Rear buffer plank	2
F4	Front buffer plank overlay	2
F5	Rear buffer plank overlay	2
F6	Footplate overlay	3
F7	LH hanging bar overlay	2
F8	RH hanging bar overlay	2
F9	LH hanging bar rivet strip	2
F10	RH hanging bar rivet strip	2
F11	Front frame extension inner plate	2

Footplate. Fold the hanging plate supports down on the footplate support (F1) so that they are at 90°. If required for your locomotive, emboss the rivets on the splasher beading on the footplate overlay (F6). Clean up the top edge of the front and rear buffer planks (F2 & F3) and then mount them on the tabs at the front and rear of the footplate support. Twist the tabs to secure and keeping the footplate flat, solder the buffer planks to the support. Clean up the edges of the front frame extension inner plates (F11) and use them to align the footplate overlay onto the support; do not twist the tabs on F11 or solder in place. Solder the overlay to the support along the outer edge along the hanging plates and buffer planks, solder about half an inch at a time and then do the other side; check that the slots remain aligned at the rear of the footplate. Remove the front frame extension inner plates. Clean up the upper edge of the buffer overlays, front and rear (F4 & F5) and attach them to the buffer planks with small amounts of solder along the outer edges. Clean up the outer edges so that the buffer planks look to be one piece of metal. Solder four 10BA nuts in place in the half etched housings on the footplate.

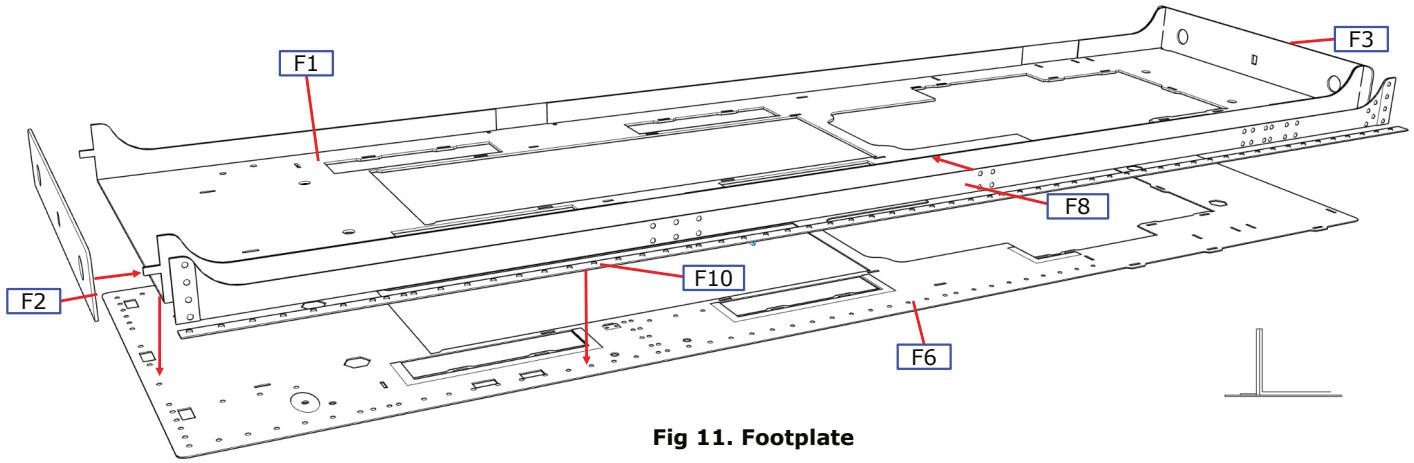
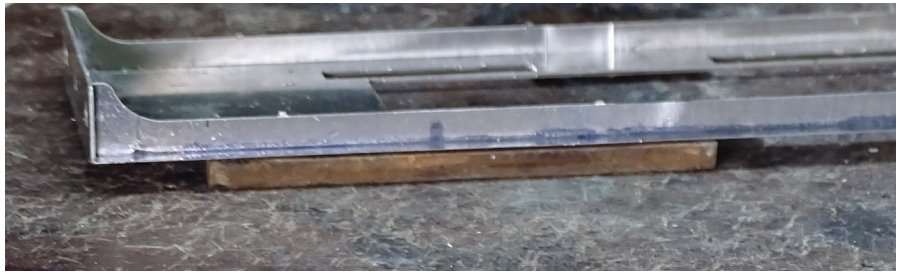
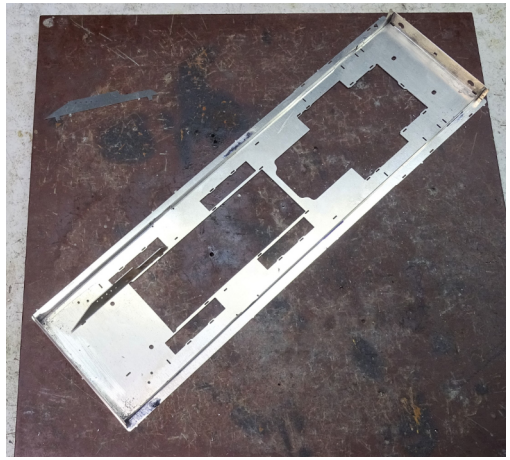


Fig 11. Footplate

Hanging Bars. Emboss the rivets in the LH and RH hanging plate overlays (F7 & F8)and remove the cusp from the ends that will touch the buffer beams and then solder in place against the hanging beam supports. Solder the the LH and RH hanging bar rivet strips (F9 & F10) to the underside of the footplate overlay butting up against the hanging bar support; the group of four tight rivets should be at the rear by the cab step cutout. Now clean up the lower edge of the hanging bars.



Footplate Construction. Place the footplate overlay upper face down and place the footplate support on top. Align the slots, using a front frame extension inner plate. Tack solder in three places either side. Seam solder, in short lengths, with the overlay supported by a piece of wood while pushing down with a suitable object such as a piece of wood.



FOOTPLATE 2

Solder the four 10BA nuts into the captive locations on the top of the footplate.

Front Splashers. Place the front frame extension inner plates (F11) into the slots in the footplate and secure the tabs. Solder to the footplate ensuring that the footplate remains flat and that the frame extensions are vertical; a pointed pair of tweezers can help hold the thin section of footplate to the extension. Clean up the bottom edge of the front frame extension and splasher back (F12) and solder to the outside face of the frame extension inner. Align the two pieces with a drill through the row of bolt holes. Clean up the upper edge. Insert the five cast Saddle Bolts (BR2) into the holes in each frame extension from the outside and solder in place. Clean up the inner face so that it flush and that the resin cast saddle fits in place.

Clean up the lower edge of the front splasher outer face (F13), place into the slots and secure the tabs. Solder in place. Clean up the inner faces of the splashers so that they are smooth. Roll the front splasher top (F14) with a 20mm piece of dowel until the top matches the splasher sides. Solder in place.

Centre Splasher. Clean the cusp off the centre upper frame extension (F15), place into the slots and secure the tabs; solder in place. Solder the centre splasher back (F16) in place on the front of the frame extension. Clean the cusp on the centre splasher outer face (F17), place into the slots and secure the tabs; solder in place. Roll the centre splasher top (F18) with a 23mm piece of dowel until the top matches the splasher sides. File the chamfer on the ends so that the top sits flat on the footplate. Solder in place from the front edge and then along the splasher sides. Clean up.

Rear Splasher. Fit these (F19 and F20) after the cab front is fitted. (Page 15).

Remove all the tabs sticking out from the footplate and finish smooth and flat. Chamfer the lower edge of the splasher top as shown below.

No.	Description	Sheet	No.	Description	Sheet
F11	Front frame extension inner plate	2	F16	Centre splasher back	2
F12	Front frame extension and splasher back	2	F17	Centre splasher outer face	2
F13	Front splasher outer face	2	F18	Centre splasher top	2
F14	Front splasher top	2	F19	Rear splasher outer face	2
F15	Centre upper frame extension	2	F20	Rear splasher top	2

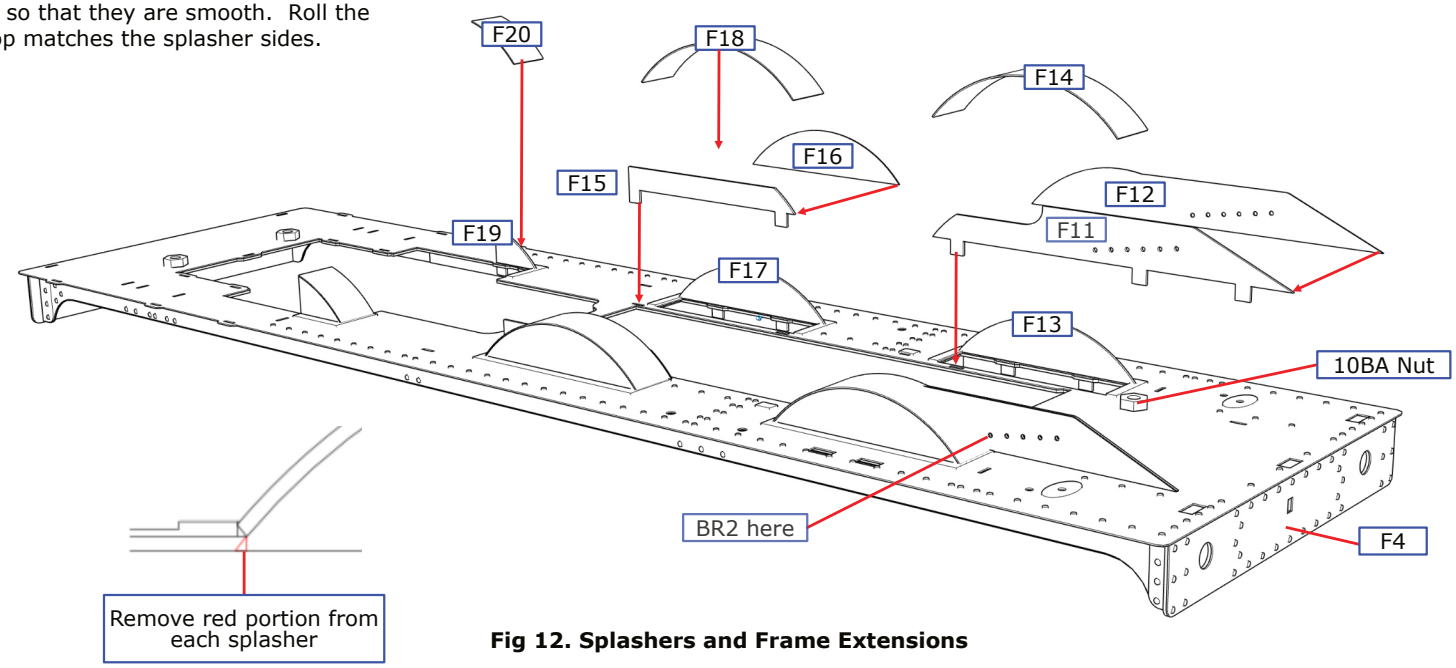
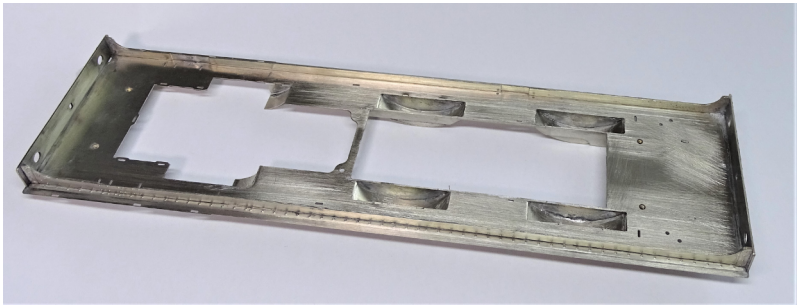
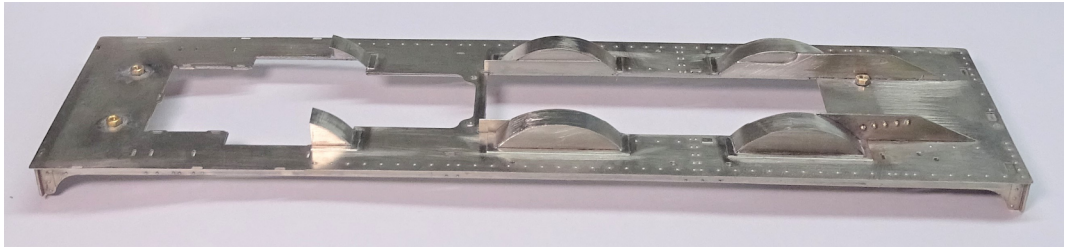


Fig 12. Splashers and Frame Extensions





FOOTPLATE 3

Footplate Front Step. Remove the cusp from all the components. Emboss the rivets in the front step tread (F22), and fold the three side flanges. Tin the rear flange and then solder to the step back (F21). Tin the mating face of the step and solder into the recess on the inside of the hanging plate. Repeat for the other side.

Cab Steps. Remove the cusp from all the components. Emboss the rivets in the cab left and right step backs (F23 & F24). Emboss the rivets on the upper and lower treads (F25 & F26), and fold the three side flanges. Tin the rear flange and then solder to the step back. Tin the mating face at the top of the step back and solder into the recess on the inside of the hanging plate. Repeat for the other side.

Bunker Step. The variations of which loco had which steps and where is best solved from a photograph of your chosen loco. These steps are best soldered in place once the bunker is built as the step on the buffer plank will obstruct the slot for the bunker support. Remove the cusp from all the components. Emboss the rivets in the step treads, upper and lower (F28 & F29), and fold the three side flanges. Tin the rear flange and then solder to the step back (F27). Tin the mating face of the step and solder to the right hanging plate and/or the rear buffer beam

No.	Description	Sheet
F21	Footplate front step back	2
F22	Footplate front step tread (2)	2
F23	Cab left step back	2
F24	Cab right step back	2
F25	Cab step upper tread (2)	2
F26	Cab step lower tread (2)	2
F27	Bunker step back	2
F28	Bunker step upper tread (2)	2
F29	Bunker step lower tread (2)	2

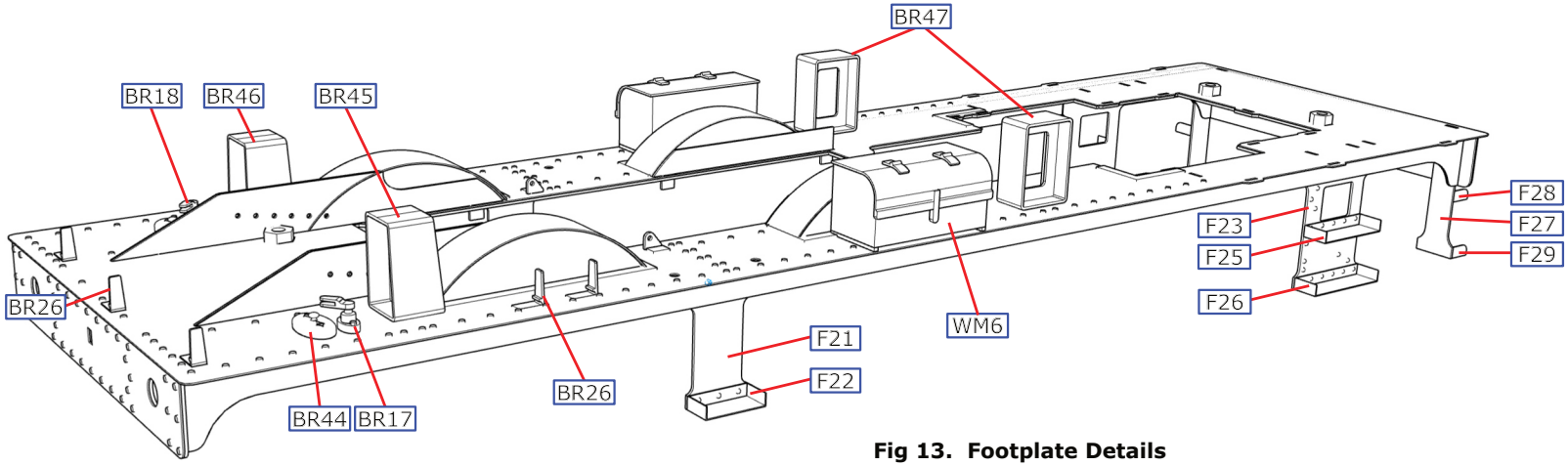


Fig 13. Footplate Details

Trial Assembly. Check that the underside of the footplate is smooth and flat. Place the footplate onto the chassis and bolt together with the four 10BA screws. Cut the screws flush with the top of the nuts at the bunker end. Swap these screws to the saddle position and put the longer screws into the bunker nuts and cut flush.

Check that the chassis runs smoothly and that nothing is touching the footplate to cause a short. If necessary adjust to obtain clear and smooth running.

CAB 1

Cab Floor. Clean up the cab floor support (U1), the door step front (U2), the door step back (U3). Put the tabs of the floor support into the footplate and then ease the tabs of the door step front and back into the floor support and the footplate with the slots of the door step parts facing inside. Solder the floor support vertical followed by the door supports. The door step back (U4) should slide into the slots in the door support. Solder in place. Clean up and ensure the top of this structure is flat. Clean the cusp off the cab outer floor base (U5) and then solder in place ensuring that the outer edges line up with the slots of the footplate; use of the cab inner sheet will help line things up. Laminate the cab outer floor (U6) onto the base by soldering around the outer edges with minimum solder. Clean up. The centre floor etches are fitted later when the cab and backhead are complete.

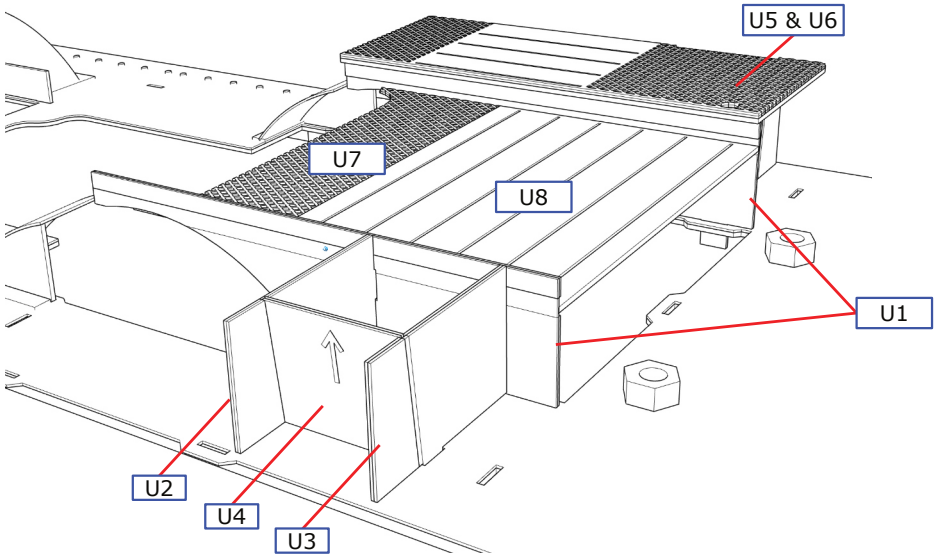


Fig 14. Cab Floor Construction

Cab Floor. The cab floor centre chequer board (U7) and the cab floor centre planking (U8) are designed to be slid in place after the backhead has been fixed in place at the end of the build.

No.	Description	Sheet	No.	Description	Sheet
U1	Cab floor support L & R	4	U7	Cab floor centre chequer board	4
U2	Door step front L & R	4	U8	Cab floor centre planking	4
U3	Door step back L & R	4	U9	Seat back (3)	4
U4	Door step back	4	U10	Seat (3)	4
U5	Cab outer floor base L & R	4	U16	Cab inner right	4
U6	Cab outer floor overlay L & R	4	U17	Cab inner left	4

Cab Seats. Hold the side of the cab inner left and right (U16 & U17) in a hold and fold and bend the roof support portion so that it matches the profile of the cab front and back. Fill the inside of the fold with solder and smooth off.

Clear the holes in the two seat arms to 0.5mm and fold the arms out at right angles. Emboss the rivets on the seat back (U9) and sweat into place on the cab side with the seat arms through the slots in the seat back. Solder the two laminates of the seat (U10) together and clean up and round the edges. Solder a length of 0.45mm wire to the seat and reduce the length of the wire to just under 1mm either side. Place it into the holes in the arms using tweezers to open up the arms and spring into place. The seat is not intended to work and should be soldered into the up or down position.

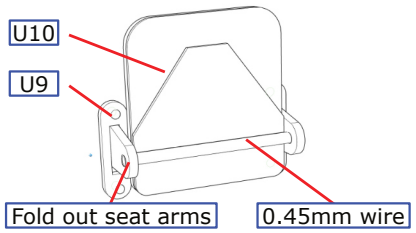


Fig 15. Seat

Cab Sides. Clear the 0.5mm holes in the cab door hinges (BR13 & BR14) and the cab door mountings (BR15 & BR16). Assemble the doors with 0.5mm wire and small blob of solder with the door hinge above the mounting hinge. Solder the mounting in place behind the door opening with the pins in the cab side. File the pins flush.

Bunker Steps. The bunker steps can either be fitted now or after the bunker side overlay is in place.

Clean up the castings for the bunker middle and top steps (BR10) and bottom step (BR9) so that they fit the holes in the left bunker side snugly. Solder in place from the inside.

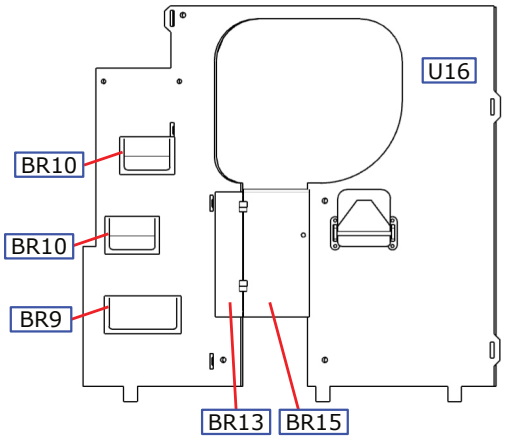


Fig 16. Cab Left Side

CAB 2

No.	Description	Sheet
U11	Coal door	4
U12	Coal door rails (L & R)	4
U13	Bunker hatch hinges (4)	4
U14	Cab window bar bending jig	4
U18	Cab inner back	4
U21	Cab rear overlay	4

Cab Inner Back. Remove the cusp from the cab inner back (U18) and make the two folds ensuring they are at right angles and that the top and bottom sheets are parallel.

Repeat the construction of the cab seat on the cab inner back.

Prepare the coal door (U11) and solder in place using a piece of 0.7mm wire to replicate the handle and to position the coal door correctly. Emboss the rivets on the coal door rails (U12) and sweat them onto the rails on the door etch.

Remove the tabs of the bunker hatch hinges (U13) and solder into the recesses on the cab inner face. The hinge bodies are made by soldering lengths of 28SWG wire into the half etch on the hinges.

Use 0.45mm drills to clear the coal bar holes, and then use them to align the cab rear overlay (U21) over the cab inner back and carefully solder in place around the outside. Clean up.

The coal bars are bent from 0.45mm wire using the jig (U14) to get the bends in the correct place. Make the first bend using a pair of pliers and then insert the short length into the appropriate hole in the jig. Make the second bend through the matching slot in the jig; this bend can be made sharper with a pair of pliers to match the first bend. Insert the wire into the matching holes on the cab back and use a cut off piece of etch surround to space the the rail from the cab back; solder in place. Repeat this process to build up all the coal rails. Finish flush on the inside of the cab.

Fit the handbrake housing (BR6) so that the housing is flat to the inside face of the back. Solder in place and clean up. Fit the handbrake handle and standard (BR7). Fit the fire iron store (BR8). Fit the cab toolbox (WM7).

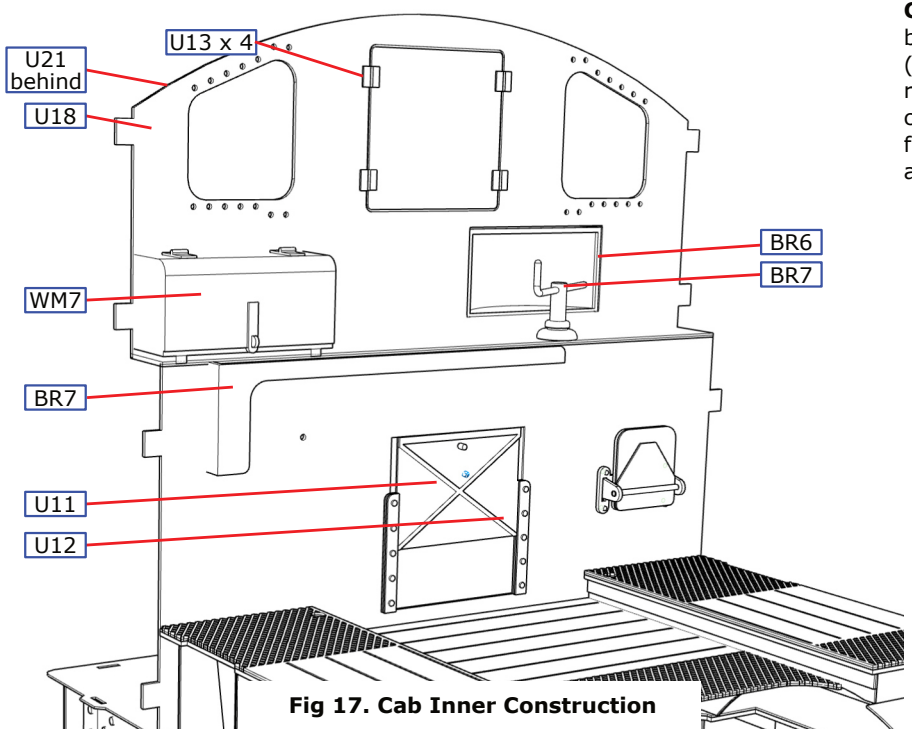


Fig 17. Cab Inner Construction

Cab Windows. The cab windows can either be fitted now and be masked for painting or they can be fitted later using tweezers (fiddly but possible). The laser cut windows should fit into recesses in the cab front and rear They are best retained with canopy glue. Clean up and, if appropriate, polish the cab window frames (BR11 and BR12) and glue them in place over the glazing again using canopy glue.

CAB ASSEMBLY

Cab Construction. Place the cab inner back into the three slots in the footplate and secure. Ensure that the cab back is square to the footplate and solder in place. Place the cab front (U15) into the two slots on the footplate, secure and solder in place from the inside. Place the first cab side into the three slots on the footplate at an angle to clear the tabs on the cab front and back and then bring it into the vertical and onto the tabs of the back and front plates. Secure the side with all the tabs. .

No.	Description	Sheet
U15	Cab inner front	4
U18	Cab inner back	4

The reverser base (BR32), reverser lever (BR33) and sanding lever (BR34) can now be fitted or left until the rest of the cab is fitted out. Solder the reverser base to the side of the cab floor support ensuring that it is NOT soldered to the sliding floor. Fit the sanding lever to the cab outer floor overlay with the front touching the cab front. Solder in place.

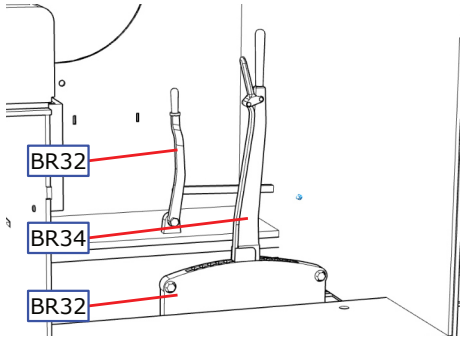


Fig 18. Cab Floor Levers

Repeat the assembly procedure for the other side of the cab.

Now solder the cab together and to the footplate. Solder the front vertical from the outside to remove the need to clean the inside of the joint. Likewise solder the bottom of the cab sides to the footplate from where it is accessible on the inside under the cab floor; do not solder from the outside to the footplate. Now remove all the tabs on the cab side and front and clean up to obtain a flat and smooth structure. Leave the six cab side tabs through the floor until the outer laminations are attached.

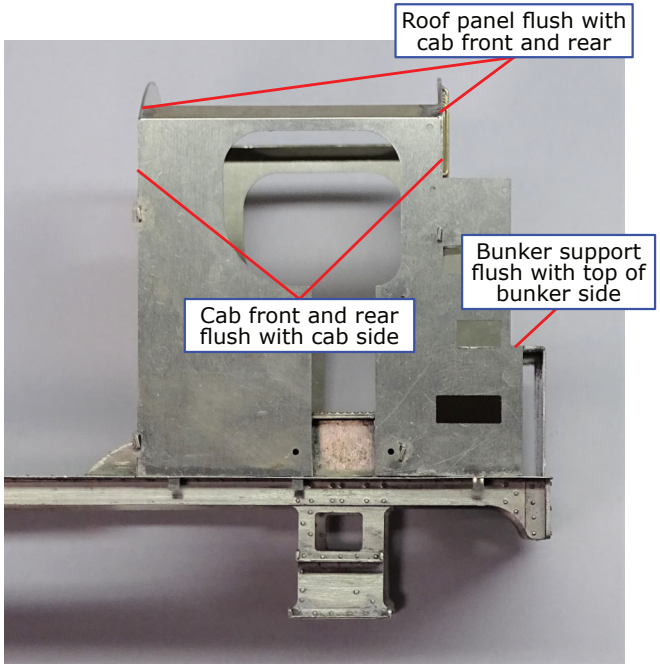


Fig 19. Cab Shell Construction

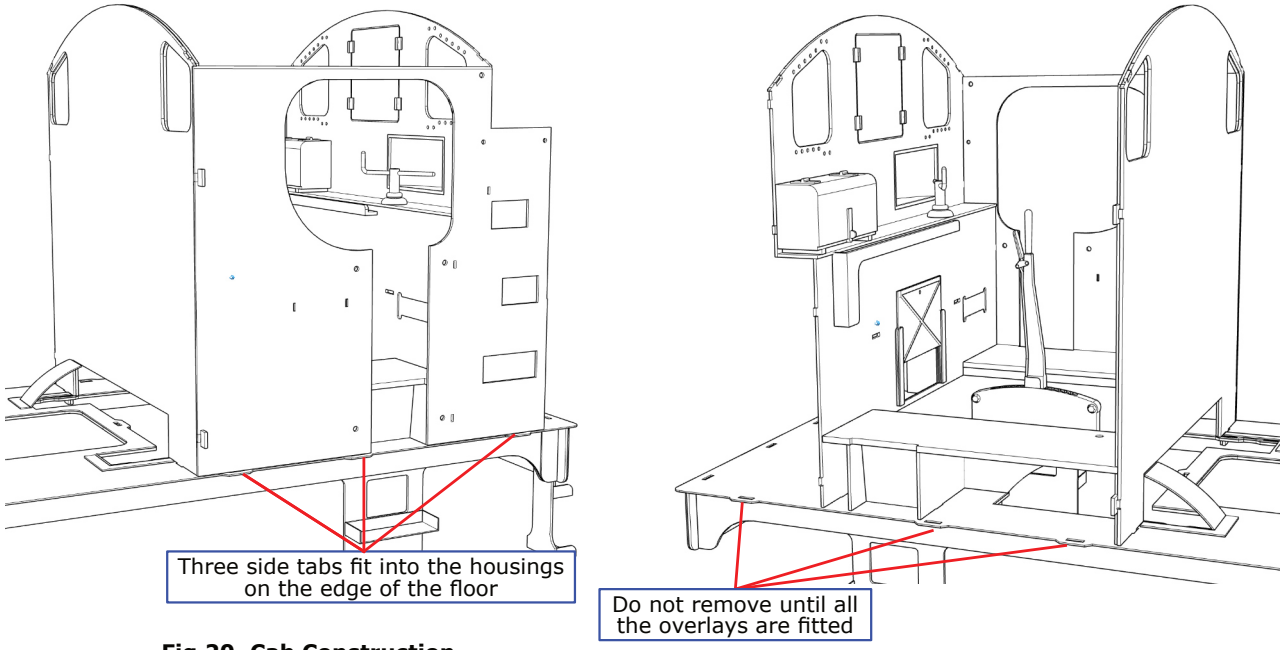


Fig 20. Cab Construction

CAB OVERLAYS & BUNKER 1

Cab Overlays. There are multiple choices of cab overlays to cater for the variation in riveting. Select the appropriate overlays to suit your chosen locomotive.

Carefully position the cab front overlay (U20) over the cab inner front; drills placed through the whistle pipe holes can help the alignment. Solder around the outside and then dress flat on the corners. File the 1.5mm (ish) radius to the edges of the cab roof indicated by the blue line.

Now build in the rear splashers. Clean the cusp off the rear splasher outer face (F19), place into the slots and secure the tabs; solder in place. Curve the rear splasher top (F20) to match the outer face and file the chamfers so that it sits down onto the footplate and the cab front. Clean up to make smooth.

No.	Description	Sheet
F19	Rear splasher outer face	2
F20	Rear splasher top	2
U19	Bunker support	4
U20a	Cab front overlay, no lower rivets	3
U20b	Cab front overlay, with lower rivets	3
U22a	Cab left front overlay, flush	3
U22b	Cab left front overlay, snap head rivets	3
U23a	Cab right front overlay, flush	3
U23b	Cab right front overlay, snap head rivets	3
U24a	Cab left rear overlay, full rivets	3
U24b	Cab left rear overlay, half rivets	3
U25a	Cab right rear overlay, full rivets	3
U25b	Cab right rear overlay, half rivets	3

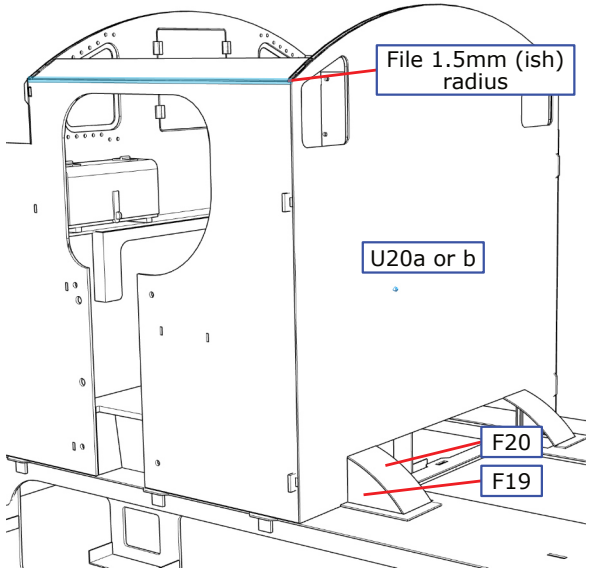


Fig 21. Cab Front

Select the appropriate cab left front overlay (U22a or b) and solder in place so that the front edge lines up with the front of the cab front overlay. Ensure that the two front slots for the cab inner are full of solder. The front joint and the footplate joints can now be made smooth and invisible. Repeat for the appropriate cab right front overlay (U23a or b).

Select the appropriate cab left rear overlay (U24a or b) and solder in place so that the front edge lines up with the front cab door opening. Ensure that the rear slot for the cab inner is full of solder. The front joint and the footplate joints can now be made smooth and invisible. Repeat for the appropriate cab right rear overlay (U25a or b).

Cab Door Handrails. Install the cab handrails using eight short handrail knobs and 0.7mm NS wire. File the handrail knobs flush on the inside of the cab.

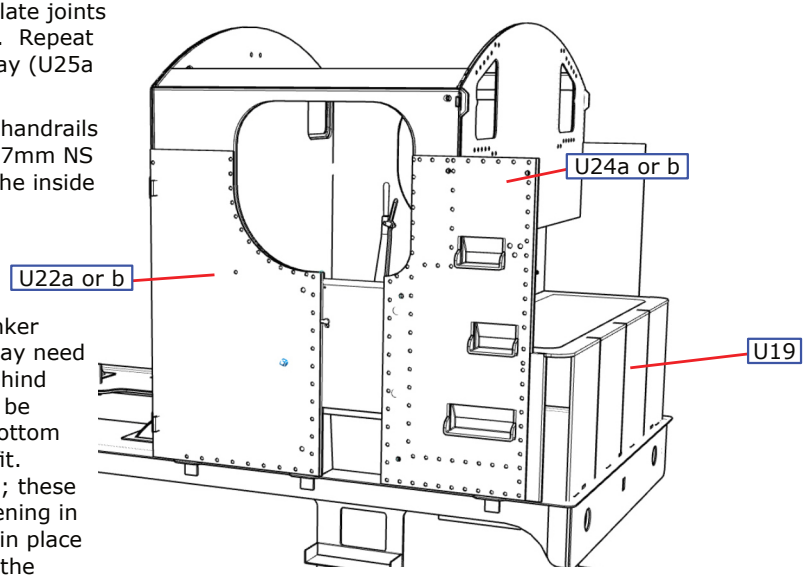


Fig 22. Cab Side Overlay and Bunker

Bunker Support. Remove the cusp on the bunker support (U19) and try in place. The two tabs may need slight tapers filling to allow the tab to feed in behind the buffer plank. The top of the support should be flush with the top of the bunker sides and the bottom of the support may need filling back slightly to fit. Open up the three recesses to fit the lamp irons; these will be soldered to the footplate through the opening in the support. When satisfied with the fit, solder in place against the inside of the bunker sides and from the footplate underside to secure the two tabs; do not solder from the outside to the footplate.

CAB OVERLAYS & BUNKER 2

Bunker Overlay. There is a choice of bunker overlays with full riveting (U26a) and partial riveting (U26b). Open up the three recesses to fit the lamp irons. The position of the start of the curves for the bunker overlay are half etched onto the back surface of Sheet 5. With a ruler and a suitable marker or scriber (use lightly), transfer these lines onto the overlay. Remove the bunker overlay from the etch and remove the tabs. Bend the curves around a 2mm drill to obtain a final radius of 2.3mm. If the curves are correct the front of the overlay should butt up to the bunker sides. Tin the exposed part of the cab inner and the bottom of the bunker support, keeping solder off the footplate. Sweat the bunker overlay into position. Ensure that there is no solder left on the top face of the bunker support.

Fit the bunker lamp irons (BR27) into the slots at the bottom of the bunker and solder to the footplate from the inside of the bunker. Fold up the bunker steps (U35) and fit into the slots in the bunker; again attempt to solder from the inside of the bunker. Fit the bunker fire irons (BR29) to the bunker and solder in place.

Ensure that all the surfaces that the bunker resin casting will touch are flat and free from solder and grease. The bunker can now be glued in place. Fit the bunker beading (U30) over the top of the metal and resin bunker parts.

Cab Windows. This is another place where cab windows can be fitted and be masked for painting or they can be fitted later using tweezers (fiddly but possible). The laser cut windows should fit into recesses in the cab front. And rear They are best retained with canopy glue. Clean up and polish the cab window frames (BR11 and BR12) and glue them in place over the glazing again using canopy glue.

This would be a good time to fit the ATC bell (WM14) to the inside of the cab front left plate.

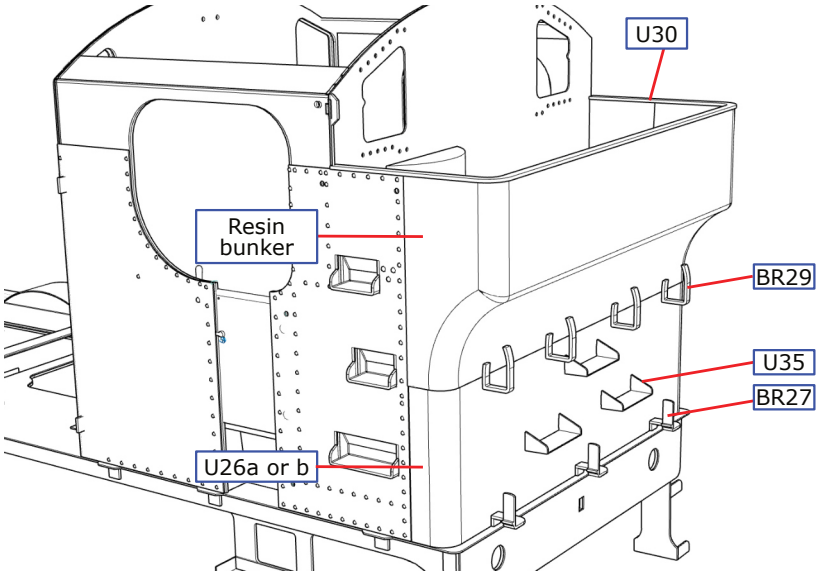


Fig 23. Bunker Details

No.	Description	Sheet	No.	Description	Sheet
U26a	Bunker overlay, full rivets		5U29	Cab cut out beading	3
U26b	Bunker overlay, partial riveting		5U30	Bunker beading	4
U27	Cab roof overlay		5U35	Bunker steps	5
U28	Cab roof hatch	4			

Roof. The position of the start of the bends for the cab roof overlay (U27) are half etched onto the back surface of Sheet 5. With a ruler and a suitable marker or scriber (use lightly), transfer these lines onto the overlay. Remove the roof overlay from the etch and remove the tabs. The bends for the roof overlay have to match the curves filled into the cab inner support. It will be best to establish the curvature of the roof first and to then make the bends. Use a 20mm diameter rod to roll the curvature on something like a mouse mat. When the curves are correct, the roof overlay should fit into the cab side overlays. To solder in place tin the inside of the cab side part of the roof. Apply lots of flux, put in place and hold down the roof and heat the overlay with a dry iron to avoid getting solder onto the outside surface. Curve and solder in place the cab roof hatch (U28).

Curve the cab cut-out beading (U29) to the shape of the cut-out and solder in place.

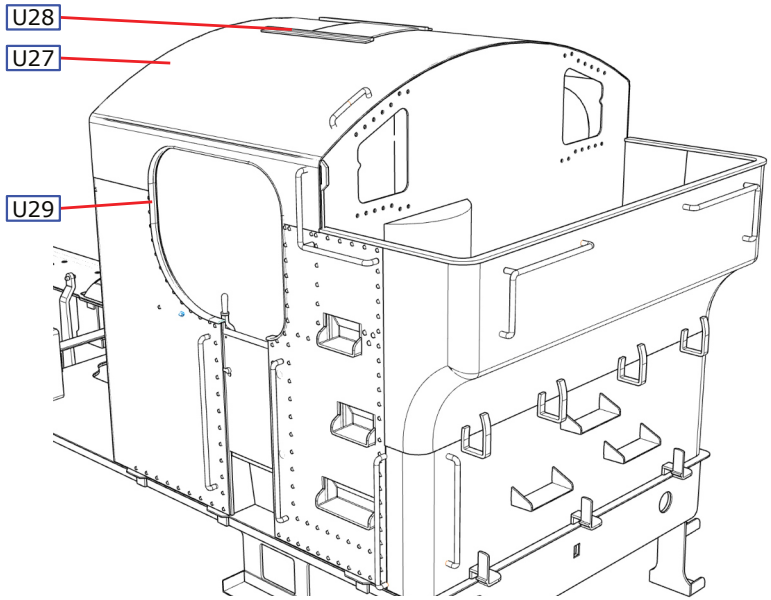


Fig 24. Cab Roof and Handrails

Handrails. The cab handrails can now be bent and fitted from 0.5mm nickel silver wire. The handrail on the cab roof is missing on some locos and will need holes drilling if required. This also applies to the bunker step handrails which follow the single bunker step around the loco.

FOOTPLATE 4

See also the graphic on p13.

Pannier Tank Supports. Clean up the front left and right tank supports (BR45 & 46) and fix into the slots on the front of the footplate from underneath. The vertical faces are towards the centre and rear. Repeat for the two rear tank supports (BR47).

Lamp Irons. Clean up the footplate lamp irons (BR26) and remove from the sprue ensuring that the base is flat. Tin the base, place the lamp iron in place with plenty of flux and solder into place by soldering from below.

Sandbox fillers. Fix the sandbox filler lids (BR44) into the holes in the front footplate.

Toolboxes. Add the footplate toolboxes (WM6) to the footplate in front of the centre splashers.

Injectors. The fitting of the injectors is described on page 18 when the Pannier Tank casting has the injector mounting holes drilled in it. Both the footplate and the tank are required to be used to position these components.

Sanding Rods. Open out the hole of the sanding rod pivots (F30) to 0.7mm. Remove from the etch and solder in place on the footplate from underneath. Cut a length of 0.7mm wire to just over 46mm long and finish to 46mm.

On the sanding rod lever laminations (F31) the hole for the rod is at the end where the tab is. Open out this hole to 0.7mm Remove a pair of sanding rod lever laminations retaining the piece of tab between them. Bend the etch on the half etch line closest to the shaft hole through 10°. Fold the two laminations back on them selves so that the bends are outwards. Use a drill or taper broach to align the laminations before soldering the lower part together. Bend the top of the laminations inwards so that they are parallel and 0.5mm drill threads through the upper holes. Mount the first one on the 0.7mm shaft at one end.

Thread the shaft through the pivot, thread a second lever onto the shaft between the frames and thread the shaft through the second pivot. Solder the shaft to a pivot so that the fixed lever matches the position on the GA. Solder the second lever hard against the left pivot parallel to the first lever. Solder a third lever on the other end of the shaft, ensuring it is parallel to the other levers. Dress the end of the shaft flat with the levers.

Clean up the left and right sanding rod pivot (BR17 & BR18) and solder into the hole in the front of the footplate from underneath. The front sanding rods (F33) need a 90° twist where the rods comes out of the front tank support at the dog leg on the etch. There are spare rods to help get this correct.

Pin each rod into place with wire and solder in place.

No.	Description	Sheet	No.	Description	Sheet
F30	Sander pivot	2	F33	Front sanding rods	2
F31	Sanding rod lever laminations	2	F34	Cylinder cover	2
F32	Rear sanding rod	2	F35	Firebox front shelf	2

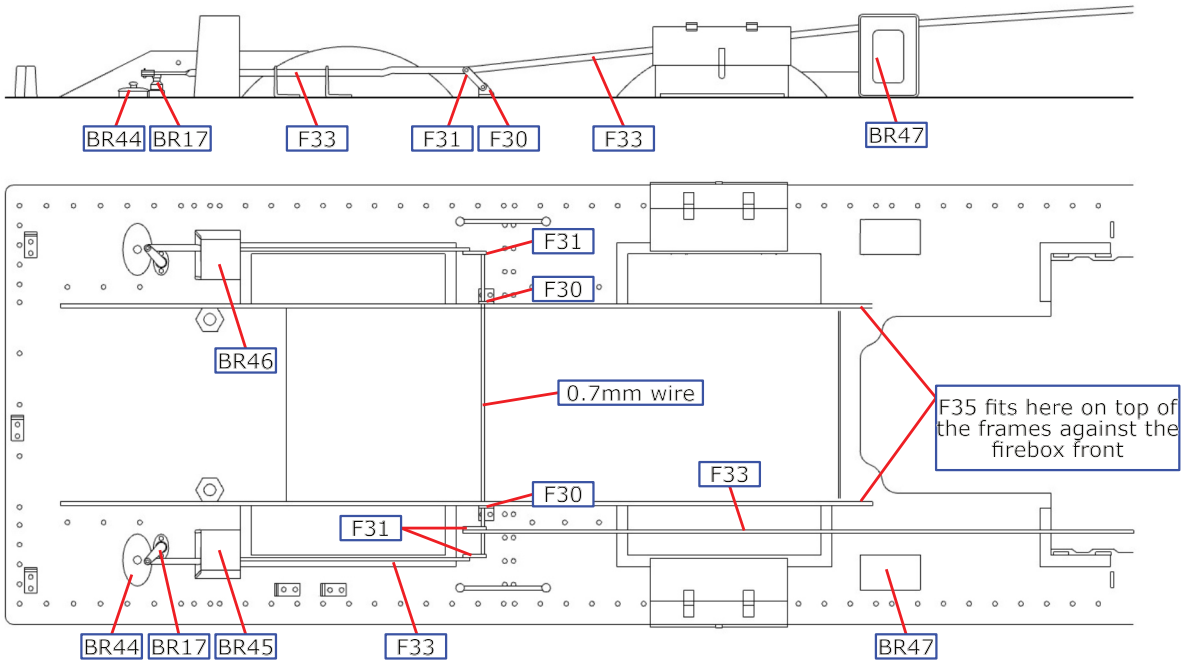


Fig 25. Footplate Details and Sanding Gear

PANNIER TANKS AND BOILER 1

Because of small differences in each casting as it cures, the centre frame extensions will need to be trimmed to length to fit the firebox. In addition the rear splashers will need adjusting to allow the firebox to slide in.

Place the resin saddle between the frame extensions with the rear lip hard against the footplate. Using the hole in the footplate as a guide, drill a 1.4mm hole through the saddle. Tap 10BA and open up the hole in the footplate to 1.8mm. Screw the saddle in place with a 10BA screw that is just short of the smokebox recess in the saddle. Place the tank & boiler casting in place on the footplate and hold in place while you drill two 1.4mm holes into the resin firebox through the associated holes in the footplate. Tap the holes in the resin 10BA and then open the two holes in the footplate up to 1.8mm.

The four 10BA screws are intended to hold the tank in place while the build takes place. We recommend that, as the loco is bound to be picked up by the tanks, the resin parts are glued to the footplate and cab with a thin smear of Araldite or Devcon onto clean metal.

We have placed conical holes where holes need to be drilled to fit fittings. Use the guide in Fig 26 to drill the appropriate holes in the resin. The quoted dimensions are the size of the spigot and you may wish to drill a slightly larger hole to allow for glue.

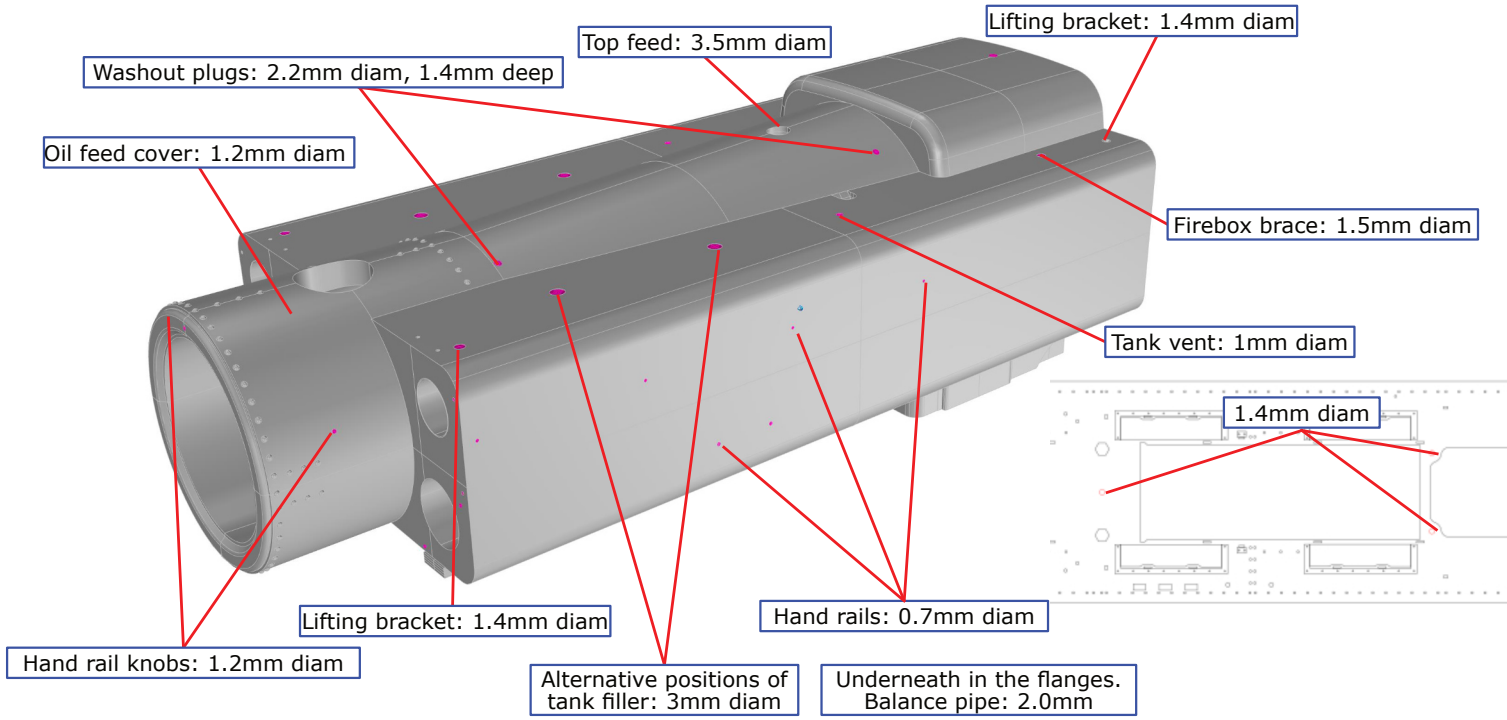
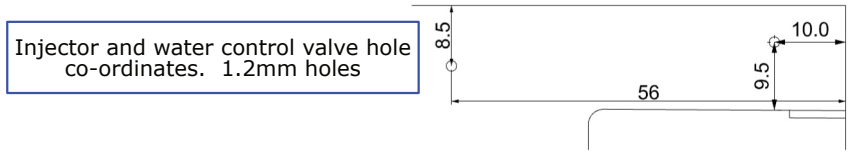


Fig 26. Tank and Boiler Holes

Injectors. The injectors and water control valve installation is shown in Fig 27. Drill holes for the 0.5mm wire in the water control valve on the left injector (BR19) and the right water control valve (BR21); these wires can be soldered into place in the cab when the injectors are fixed to the footplate. Drill 1.0mm holes in the left injector (BR19) and the right injector (BR20) for the pipes. Solder the left water control valve into place on the left injector. The arrangement of the pipes can differ between individual locomotives and should be checked against photographs of your selected locomotive. The right hand injector has a mounting bracket which should be soldered to the footplate. Use the 1mm copper wire for the pipe runs.

When the pannier tank is fixed to the footplate/cab, glue the left water control valve and the two pipes running forward into the tank.



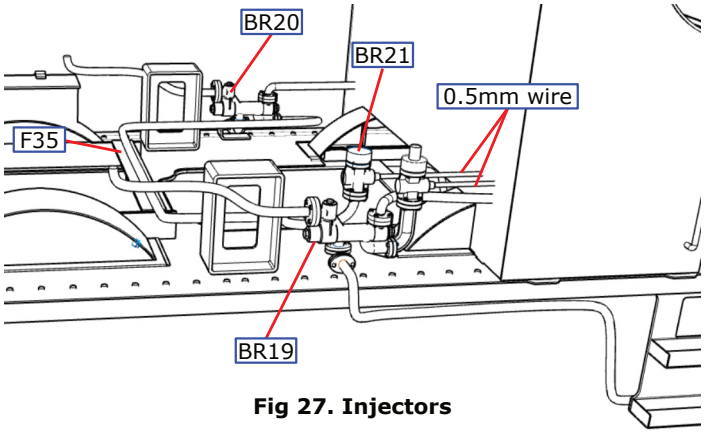


Fig 27. Injectors

PANNIER TANKS AND BOILER 2

Tank Front. Fit the tank front plates (U37) to the front of the pannier tanks. When the glue has cured drill the lower and middle step holes 1.0mm and the top step holes 0.8mm. Drill the handrail holes 0.6mm. Fit the steps (BR39, BR40 and BR41) and the tank front handrails, bent from 0.6mm NS wire.

Tank Top. Fit the top feed casting (WM8) into a 3.5mm hole. The feed pipes are made from short lengths of 2mm copper wire that are glued in place. Select the appropriate tank top cladding set, forward water filler (U38 & U39) or rearward water filler (U40 & U41) and the rear cladding (U42 & U43) and glue in place. The cladding can be used as a guide for drilling the holes. For the washout plugs (BR35) drill holes 2.2mm diameter and 1.5mm deep. Glue the washout plugs in place. Glue the mud hole doors (WM9) onto the shoulder of the firebox using the GA and photographs as a guide to position. Fit the safety valves (BR48) to the top feed.

Tank Handrails. These are made from 0.6mm NS wire. There is a hole drilling jig on Etch 5 to drill holes in a piece of Tufnol or wood to assemble the long handrail. Glue the handrails into the resin casting.

Smokebox. Fit the smokebox door (WM10) into the front of the smokebox and add the smoke box door dart (BR31) Fold up and fit the smoke box handrails. Fit the smokebox step (U36) to the underside of the smokebox.

Tank Underside. Fit the balance pipe (WM11) into the holes in the flanges on the underside of the tanks.

Tank Top. Fit the firebox brace (BR22) in place as shown above. The lifting brackets will need rings making from 0.6mm wire. Fit the lifting brackets (BR23) Fit the tank fillers (BR24) and the tank vents (BR25). Fit the smokebox top lamp iron (BR28) on top of the smokebox. Fit the oil feed cover (BR30) in place as shown in the inset in Fig 28.

No.	Description	Sheet	No.	Description	Sheet
U36	Smokebox step	5	U40	Left tank top forward cladding, rearward filler	5
U37	Tank front plates (L & R)	5	U41	Right tank top forward cladding, rearward filler	5
U38	Left tank top forward cladding, forward filler	5	U42	Left tank top rear cladding	5
U39	Right tank top forward cladding, forward filler	5	U43	Right tank top rear cladding	5

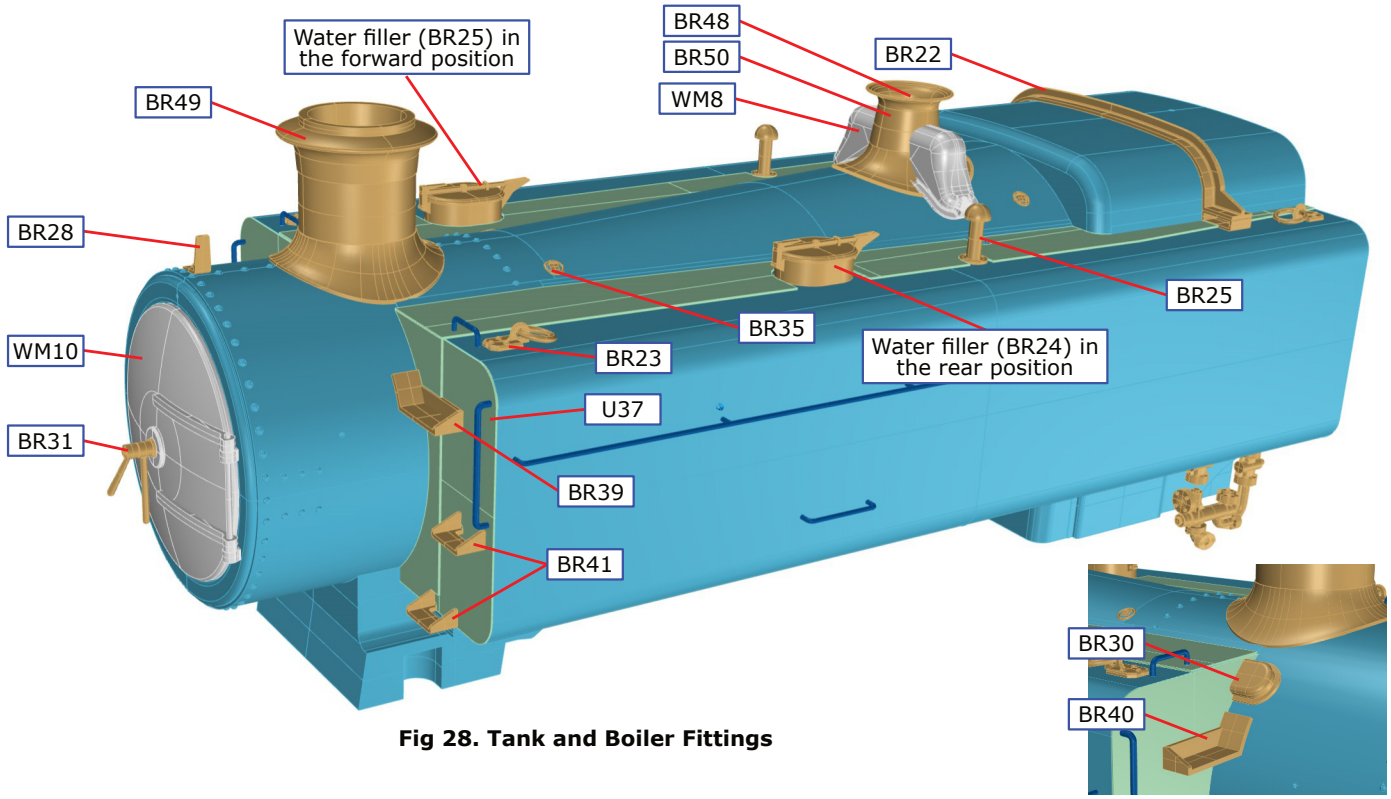


Fig 28. Tank and Boiler Fittings

UPPER DETAILS

Make up the buffers as shown in the diagram and fit the Collett parallel buffer casing (WM13) to the buffer planks.

Either fit the valve extension covers (BR36) onto the footplate in front of the saddle or fit the cylinder cover (F34) onto the frames.

Once the pannier tanks and cab/footplate are joined fit the cab front /tank angle vertical (U31) onto the front of the cab so that it touches the pannier tank. The cab front/tank angle horizontal (U32) sits in front of the vertical and needs to folded to match the curves of the tank. There is a spare!

Fold the whistle shield (U33) and fit the whistle shield strut (U34) to the shield. Fit the small whistle (BR37) on the left side by threading it through the whistle shield and into the cab front. Do the same with the large whistle (BR38) on the right. Secure the whistle shield to the firebox and the whistles to the cab front.

The reverser base (BR32), reverser lever (BR33) and sanding lever (BR34) can now be fitted if not already in. Solder the reverser base to the side of the cab floor support and the sanding lever to the cab outer floor overlay.

The reversing rod (BR42) fits into a small hole on the cab front and goes over the weighshaft arm that is part of the chassis. A small piece of wire should be used to fit the fork end of the rod onto the arm. Secure with nail polish varnish.

Cab Windows. The laser cut windows should fit into recesses in the cab front. They are best retained with canopy glue. Clean up and polish the cab window frames (BR11 and BR12) and glue them in place over the glazing again using canopy glue.

No.	Description	Sheet
U7	Cab floor centre chequer board	4
U8	Cab floor centre planking	4
U31	Cab front /tank angle vertical	4
U32	Cab front/tank angle horizontal	4
U33	Whistle shield	4
U34	Whistle shield strut	4
F34	Cylinder cover	2
F35	Firebox front shelf	2

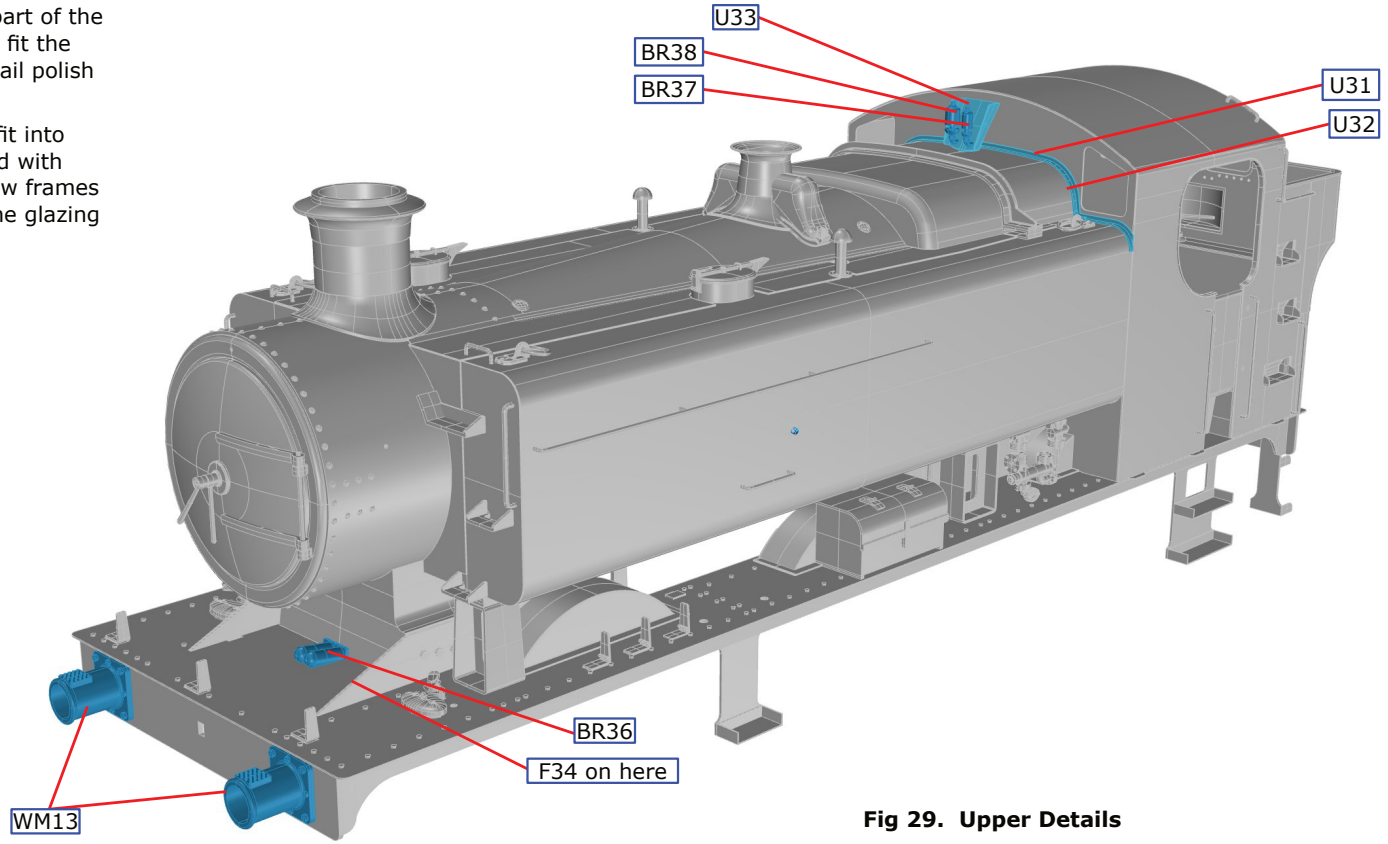


Fig 29. Upper Details

BACKHEAD AND CAB DETAIL

Backhead. The backhead (WM14) can now be detailed as shown below. It is fitted through the floor and glued the the cab front. When the backhead is in place slide the cab floor centre chequer board (U7) and the cab floor centre planking (U8) into place and secure in place.

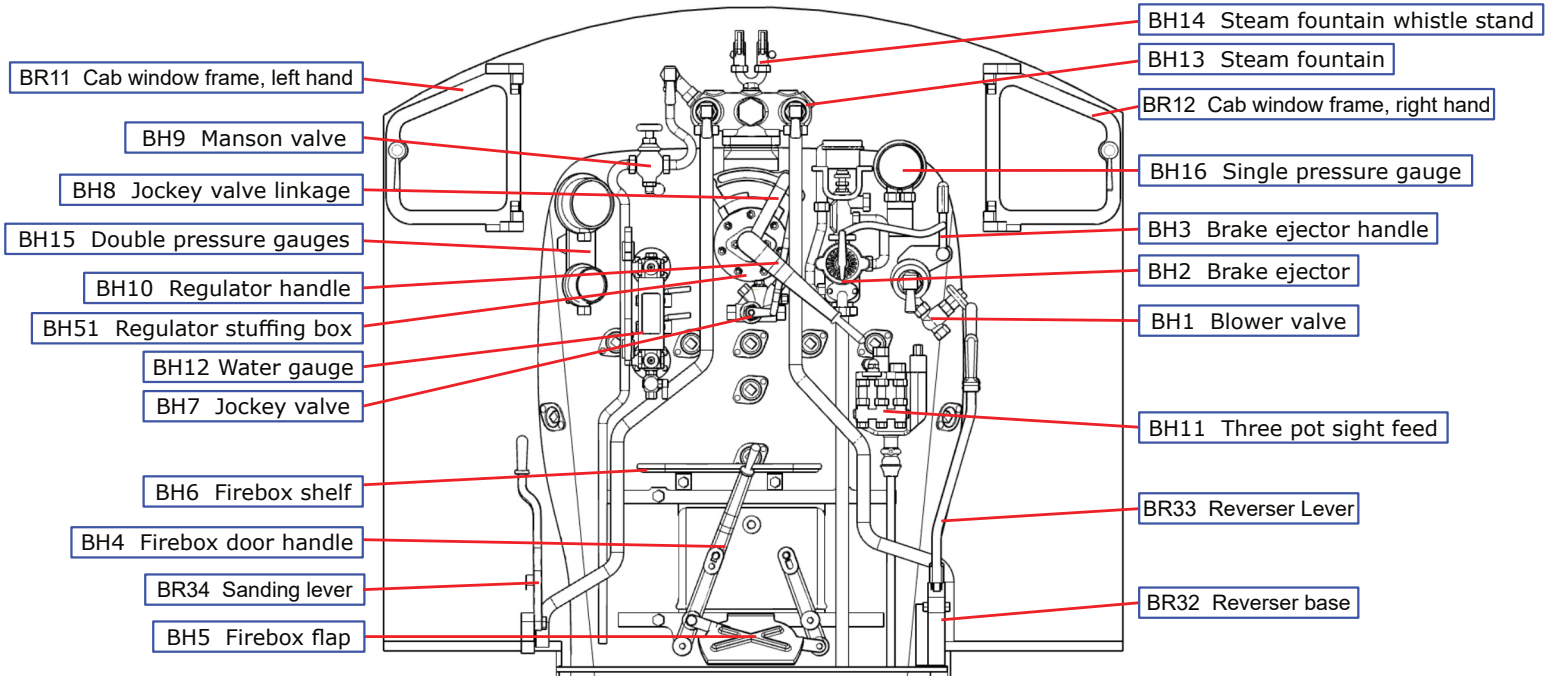
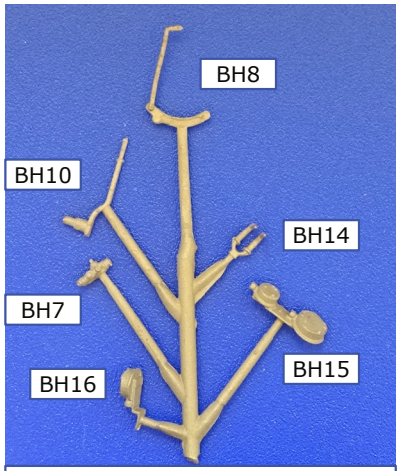
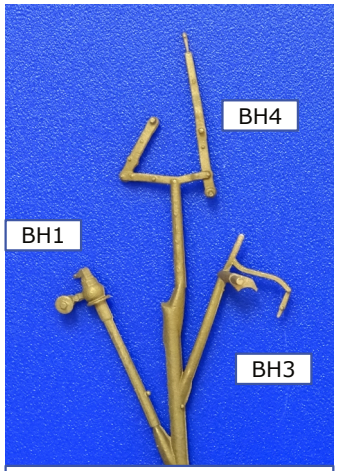


Fig 30 Cab & Backhead Fittings



Back Head 1



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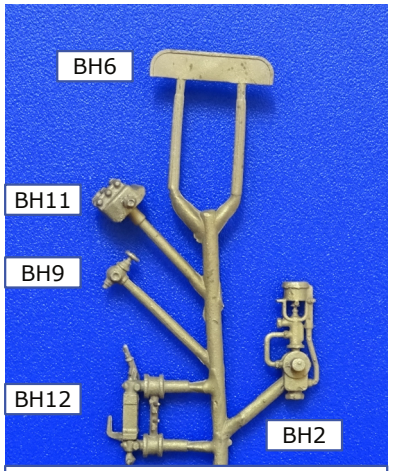

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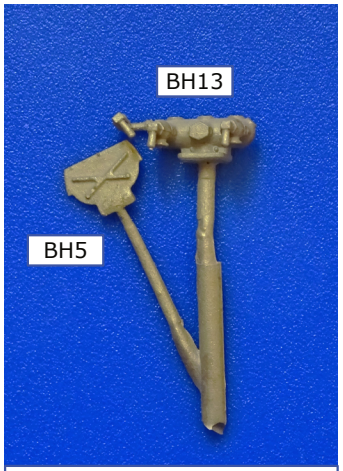


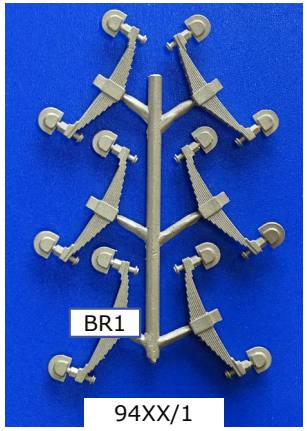
Back Head 4

Finney7

COMPONENTS 1

Brass Castings

BR1	Springs and hangers	94XX/1	BR13	Cab door, left	94XX/7	BR26	Footplate lamp iron	94XX/4	BR39	Pannier tank top step, front left	94XX/6
BR2	Saddle Bolts	94XX/4	BR14	Cab door right	94XX/7	BR27	Bunker lamp irons	94XX/11	BR40	Pannier tank top step, front right	94XX/6
BR3	Brake pivot	94XX/2	BR15	Cab door mounting, left	94XX/7	BR28	Smokebox top fire irons	94XX/11	BR41	Pannier tank front step	94XX/6
BR4	Brake hangers	94XX/2	BR16	Cab door mounting, right	94XX/7	BR29	Bunker fire irons	94XX/11	BR42	Reversing rod	94XX/9
BR5	Brakeshaft	94XX/3	BR17	Sanding rod pivot, left	94XX/10	BR30	Oil feed cover	94XX/10	BR43	Steam brake cylinder	94XX/3
BR6	Handbrake housing	94xx/6	BR18	Sanding rod pivot, right	94XX/10	BR31	Smokebox dart	94XX/11	BR44	Sandbox filler lids	94XX/10
BR7	Handbrake handle and standard	94XX/8	BR19	Injector & water control valve, left	94XX/7	BR32	Reverser base	94XX/5	BR45	Tank support, front left	94XX/5
BR8	Fire iron store	94XX/5	BR20	Injector, right	94XX/7	BR33	Reversing lever	94XX/9	BR46	Tank support, front right	94XX/5
BR9	Bunker bottom step	94XX/6	BR21	Water control valve, right	94XX/10	BR34	Sanding lever	94XX/9	BR47	Tank support, rear	94XX/5
BR10	Bunker middle and top step	94XX/6	BR22	Firebox brace	94XX/9	BR35	Washout plugs	94XX/11	BR48	Safety Valves	94XX/10
BR11	Cab window frame, left hand	94XX/8	BR23	Lifting Brackets	94XX/9	BR36	Valve extension covers	94XX/6	BR49	Chimney	94XX/12
BR12	Cab window frame, right hand	94XX/8	BR24	Tank fillers	94XX/10	BR37	Small whistle	94XX/8	BR50	Safety valve bonnet	94XX/13
			BR25	Tank vents	94XX/10	BR38	Large whistle	94XX/8	BR51	Regulator stuffing box	94XX/8



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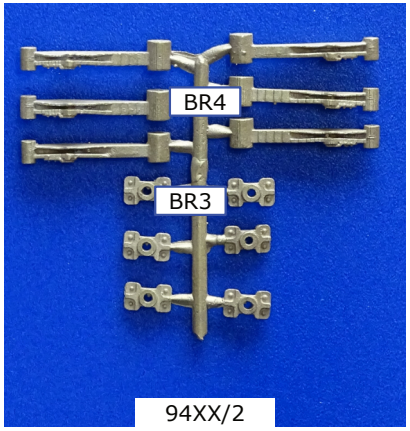

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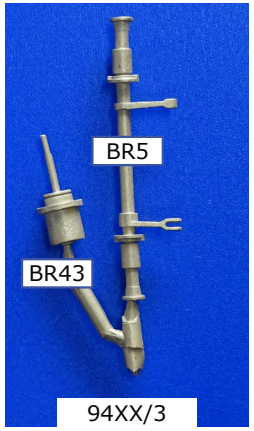

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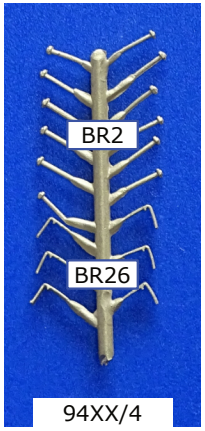

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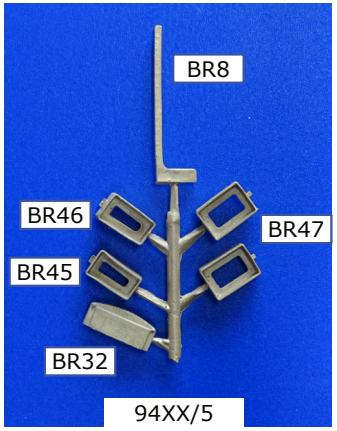

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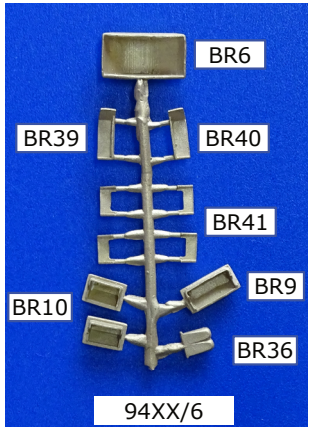

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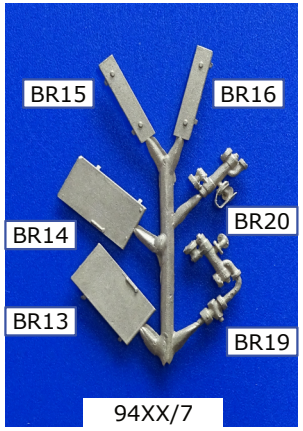

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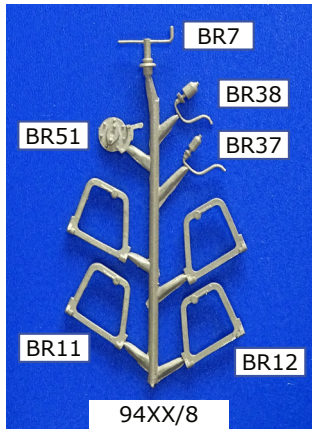

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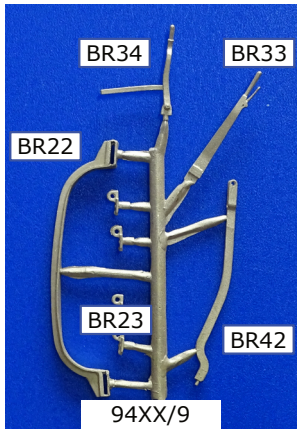

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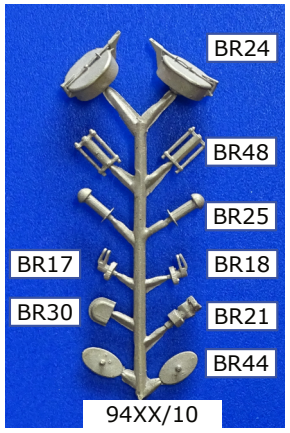

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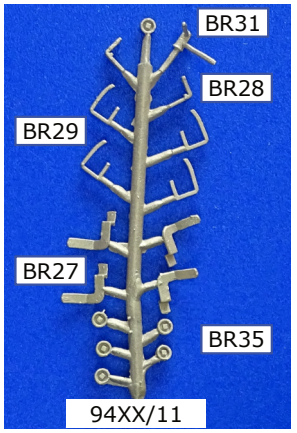


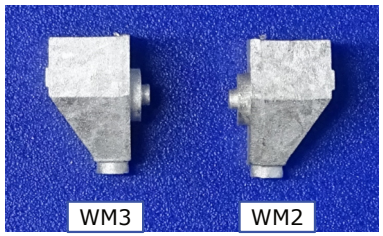
94XX/11

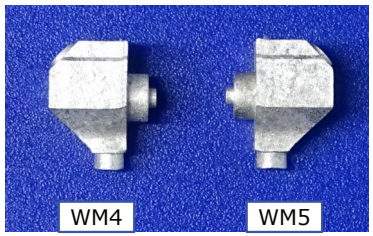
94XX/13

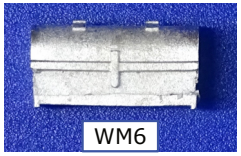
COMPONENTS 2

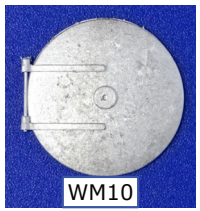
WHITEMETAL CASTINGS

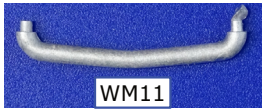
WM1 Hornblocks
WM2 Front left sandbox
WM3 Front right sandbox
WM4 Rear left sandbox
WM5 Rear right sandbox
WM6 Footplate toolbox
WM7 Cab toolbox
WM8 Top feed
WM9 Mudhole doors
WM10 Smokebox door
WM11 Balance pipe
WM12 Backhead
WM13 Collett parallel buffer casing
WM14 ATC Bell
WM15 ATC Battery











RESIN CASTINGS

Pannier and boiler
Firebox base
Bunker
Saddle
Brake shoes

OTHER COMPONENTS

3/16" bore square bearing (6)
10BA x ¼" Cheese head screws (4)
10BA nuts (4)
Short handrail knob (4)
Medium handrail knob (7)
Buffer head, spring (2mm bore) & 10BA screw (4)
1.0 mm and 1.5 mm Copper wire for backhead pipes
Vacuum pipe and steam pipe hose (4)

2.0mm x 50mm Brass rod for compensation pivots and weighshaft
1.6 mm x 25mm Steel wire for front compensation beam
1.6 mm x 25mm Nickel silver wire for coupling rod fork joints
0.5mm Nickel silver wire for handrails and coal bars
0.9mm x 150mm Brass wire for brake spreaders
1.0 mm x 150mm Brass wire for brake pivots
1.2 mm x 250mm Brass wire for vacuum pipe
1/16" x 0.8mm x 100mm Brass tube for brake spreaders
0.8mm Brass angle for cab roof.
0.9mm x 300mm Nickel silver wire